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The AIRCRAFT ENGINEER

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The Outlook

American Expansion

PRESIDENT ROOSEVELT is certainly earning the gratitude of the democracies of Europe by the foreign policy which he is pursuing. Everybody understands and respects the determination of the United States to keep out of a war if that is in any way possible, but that country, no less than other peace-loving countries, must be strong and ready to fight if it is to be able to defend all that it values in a world where some Governments have barefacedly declared that might is right.

The *amour-propre* of some Americans may be hurt by the President's blunt statement that the United States, which entered the world war on April 6, 1917, "took no part whatsoever in any major engagement until the end of May, 1918," and that as late as the autumn of 1918 the American armies at the front "used almost exclusively French or British artillery and aircraft." These are facts, however, and it will do the American people no harm to be thus reminded of them. It would be still more damaging to their pride if they were forced into another war and had again to wait over a year before their forces were equipped to fight.

So the President asks for three thousand additional aeroplanes as well as other Army and Navy equipment, bringing the aircraft equipment of the two Services up to a total of 8,520 machines. He also wishes to spend £2,000,000 on training 20,000 civil pilots, as a form of reserve. Such a force will add to the chances of peace in the world, for no aggressor could with safety push the United States to a point where there was no alternative to declaring war.

A Fracas in Australia

AT this distance it is not possible to form an opinion on the dispute now raging in Australia about the condition of the R.A.A.F. The facts are that Marshal of the Royal Air Force Sir Edward Ellington, Inspector-General of the Royal Air Force, was invited to report on the R.A.A.F., and criticised it in some respects. The Australian Air Board has disagreed with some of Sir Edward's criticisms, but the Commonwealth Government has supported Sir Edward, and the Prime Minister, Mr. Lyons, has stated that the Air Board is not absolved from the blame in the Inspector-General's criticisms, and that the main responsibility rests with Air Vice-Marshal Williams, Chief of the Air Board. As a consequence the latter is to come to England to serve for a while on the staff of Air Chief Marshal Sir Cyril Newall, Chief of the Air Staff, while Air Commodore Goble acts for him in Australia with the temporary rank of Air Vice-Marshal, and Group Capt. J. C. Russell, of the R.A.F., goes out to Australia as Air Member for Personnel on the Australian Board.

One thing is obvious to everybody, and that is that the Royal Australian Air Force ought to be in a state of readiness for war. Although commitments in China should keep Japan's hands full for some time to come, there is no guessing what the next move of the Anti-Comintern Pact may be. The empty spaces in Australia are a temptation to aggression, and therefore the Australian sword needs to be loose in its scabbard.

Another Production Director

THE Air Ministry is going ahead with its policy of appointing well-qualified civilians to help in the critical business of aircraft production, and this is certainly a line in which civilian experience is a better qualification than is high rank in the Service. The so-called shadow factories and the extensions of the works of firms which have been built at public cost are to be the special care of one man, and Mr. A. R. Cooper, M.Inst.C.E., M.I.E.E., has been chosen as director in charge of them in the department of the Director-General of Production. Mr. Cooper is an Oxford graduate who has spent most of his working life as an engineer on the underground railways of London. This does not necessarily imply that Air

Ministry factories are in future to be built underground.

The point is that these factories are to play the tune called for by the man who has paid the piper—that is to say, the public. It is an eminently reasonable proposition. Mr. Cooper does not seem to be either a strategist or a tactician, but, none the less, it is to be hoped that when other public factories are constructed steps will be taken to make it as difficult as possible, not as easy as possible, for an enemy bomber to obliterate whole blocks with one salvo. The Germans have paid great attention to this point, but in Britain it does not seem as yet to have received sufficient consideration.

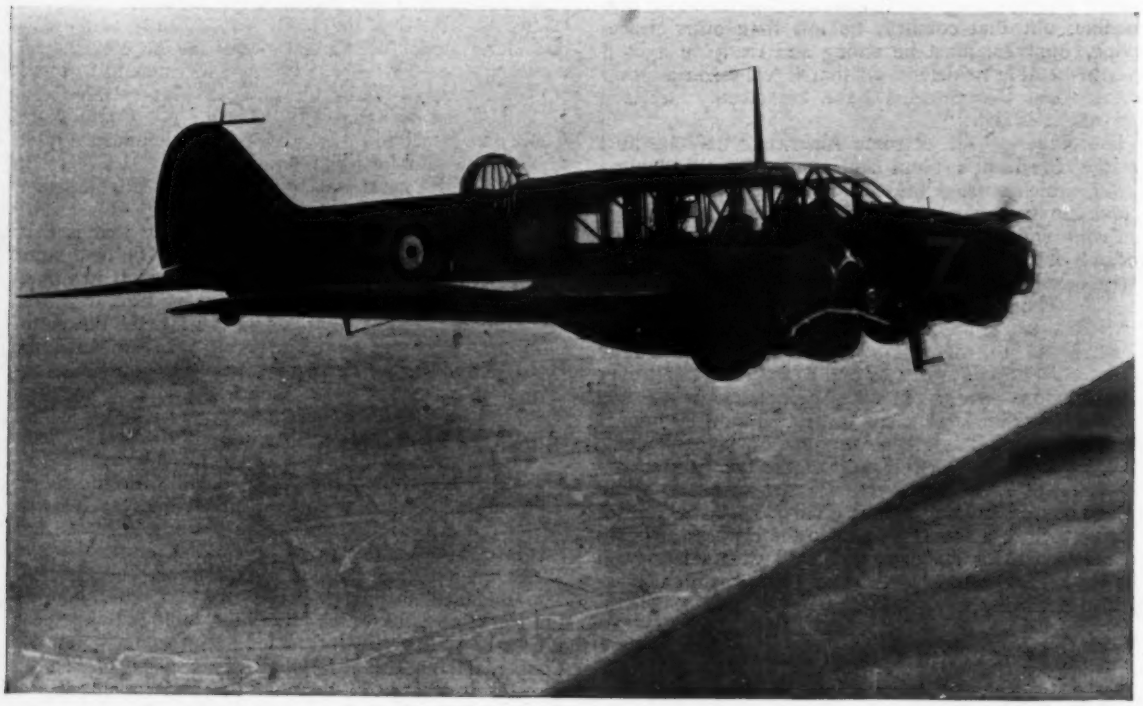
The Middle East

THE raising of the Middle East Command to the dignity of a Command-in-Chief, which is announced on page 59, it a notable step. The Middle East has always been a most important, yet strangely inchoate, Command, including as it does Egypt, the Sudan, Kenya, and the R.A.F. element of the British Forces in Palestine and Trans-Jordan. It was the late Sir Geoffrey Salmond who first demonstrated the importance of this Command, when in 1918 he provided the air co-operation with Lord Allenby's force, which first blinded the Turkish armies and then destroyed one of them completely. In addition to that, Sir Geoffrey organised the first aeroplane flight from Egypt through Iraq to India, and also laid out the first air route from Cairo to the Cape, which was used by Sir Pierre Van Ryneveld and Sir Christopher Brand on their historic flight. The Middle East is, in fact, the great air junction between Europe and Asia.

Recent developments have wrought changes in the Command. The troubles in Palestine resulted in the Army taking over the chief responsibility there from the Air Force, but the co-operation of aircraft with the troops is still a factor of great importance. The Italian conquest of Abyssinia has led to the inclusion of Kenya in the Command, and the present uncertain state of affairs in the Eastern Mediterranean has also increased the responsibilities of the R.A.F. in that part of the world. The Command now has at its disposal two fighter squadrons, and it is the only Overseas Command to possess any fighter aircraft. In fact, this Command is now so important that it has become only reasonable to raise the dignity of the officer who is in charge of it from Air Officer Commanding to Air Officer Commanding-in-Chief. The Middle East is the first Overseas Command to be thus honoured.

Probable Reorganisation

THE change naturally called for the appointment of a very senior and experienced officer, and Air Vice-Marshal Nicholl is succeeded by Air Marshal Sir William Mitchell. A better man could not have been chosen. A reorganisation of the Command is indicated, which will doubtless take the form of increased preparedness for war. It is also probable that the strength of the Command will be increased from the present establishment of eight equadrons and one flight (not counting the two squadrons and two flights which are pretty well occupied in Palestine and Trans-Jordan), of which four and the odd flight are bombers, one is bomber-transport, one army co-operation, and two are fighters. This strength is all too small for the responsibilities which the Command would have to undertake in the unfortunate event of hostilities breaking out. Again, readiness for all eventualities will certainly be



"Flight" photograph.

UTILITY RATHER THAN BEAUTY sums up this Avro Anson, which has suffered in appearance by reason of its dark camouflage. It is one of those used at Desford for training direct-entry observers, as described on page 60. There is not a tea-party in progress in the cabin—merely a navigational lesson.

(CONTINUED)

the most effective way of discouraging any inclination in any quarter to engage in the pastime of twisting the lion's tail.

Instructional Concession

AT long last a decision has been reached on the vexed question of instructors. The Air Ministry, after long negotiations with the Guild of Air Pilots and Navigators and the British Air Line Pilots' Association, announces the institution of a new type of instructor's certificate, to be known as the Assistant Flying Instructor's Certificate.

In the main the qualifications demanded remain unchanged, but the A.F.I. will not be required to be qualified in blind-flying, and the minimum solo flying hours demanded are 100 instead of 250.

Hitherto the G.A.P.A.N. has maintained the principle of closed shop in the matter of instructors. While the number of schools was small, that was both understandable and reasonable. But then the Air Ministry rushed out prematurely with its Civil Air Guard scheme, and the difficulties mentioned by *Flight* as soon as the scheme was announced were not long in appearing. Suitable types of aircraft for instructing thousands of beginners in flying, and qualified instructors to undertake the instruction were lacking. The former obstacle has not yet been surmounted, although types are now being built specially for the work. The new instructor's certificate should help to overcome the latter.

There is no reason to fear that the quality of flying instruction will suffer unduly. The G.A.P.A.N. instructors' panel will still insist on being satisfied with the ability of applicants to instruct, and anyway the first-class instructor is born and not made. If a man has it in him to become a good instructor, the ability —which is a peculiar one not easily defined—will soon become apparent. If, on the other hand, he has not the gift for that kind of work, it benefits the pupils little that he has had thousands of hours in the air and is able to judge speed and distance to a hair. If he has not the flair for communicating his gifts to the pupil he will always be a mediocre instructor.

Full-time Aircraft Crews

NECESSITY is the mother of many strange children. Expansion creates necessity and is driving the Air Ministry to various expedients which must alter the conditions of service for the airmen of the R.A.F. For the future, perhaps only the immediate future, the distinction between airmen who work on the ground and those who work in the air is to be much more definite than it used to be. Air gunners, for example, could previously be drawn from several trades, mostly wireless operators, armourers, and photographers, but sometimes an aircrafthand (who belongs to no skilled trade) might be chosen as a gunner. Now the air gunners are only to be drawn from the trade of wireless operator, and the chances of other tradesmen for doing duty in the air are thereby much reduced.

The latest decision is that in multi-seater machines all the members of the crew are to be full-time men for aircraft duties. This applies to all who are not pilots. Tradesmen allotted to crew duties will be lost for the time to their trade on the ground. At a time of expansion the trades need more and ever more skilled men and are loath to spare them for air duties. This has forced the Air Ministry to recruit direct from civil life for certain members of the crews, particularly for air observers. It is hoped to recruit 1,500 such during the present year, and an article on their training and duties appears on page 60 of this issue. Their main duty will be navigation, but they must also be competent to aim and release bombs, work the wireless, man the machine gun, and on occasion take photographs. If the hydraulic mechanism of the gun turret gets out of order they must have a working knowledge of how to put it right.

The ideal is that all members of a crew, apart from the two pilots, should be interchangeable, so that if one man is hit, someone else can carry on his work. It is therefore small wonder that crew duties are now to be a full-time job. The direct-entry air observer, who may be only 17½ years of age, becomes a sergeant with pay of 12s. 6d. a day after five months' training. It is a splendid opening for a young man, and the supply ought speedily to outstrip the demand.

Twice O=O

SOME time ago we commented on the statement that had recently been made by Sir Kingsley Wood to the effect that there had been a very great increase in monthly output of aircraft during the last year or so. We ventured to say that unless one knew the actual figures the statement did not convey very much, since twice nothing is still nothing.

Figures disclosed by M. Guy la Chambre, the French Air Minister, the other day seem to indicate that France's nationalised aircraft factories came within sight of corresponding to our jesting reference to British production. According to M. la Chambre, French production during the period September-December, 1937, was 33 first-line aircraft per month. In December of last year it had risen to 70 per month. It is expected that during this month it will attain the impressive figure of 80, and during the spring of this year it is hoped to reach a production rate of 200 per month.

Evidently French aircraft production has been in an even worse state than was generally believed. "Plan V," which originally aimed at 2,500 first-line aircraft in three years, has been speeded-up, and that number of machines is now aimed at in two years.

When one contemplates these figures one becomes a good deal less dissatisfied with our own production rate, inadequate as it is often held to be.

Temporarily Withdrawn

SOME surprise has been caused by the announcement that the five Ensign class monoplanes which have been in service with Imperial Airways for three months are to be withdrawn, and that it has been decided, as a result of this experience, to embody certain modifications before the whole fleet is put into service. It might be pointed out that the Ensign was designed some four years ago, and that consequently it is understandable that in the meantime improvements have become possible. Indeed, it would be surprising if this were not the case. There was no time to build and test a prototype, and the temporary withdrawal of these five machines is merely the equivalent of modifying a prototype before putting it into service alongside the production version.

The Ensign is a very clean aeroplane, and with a little more power for the take-off and climb it could be made to compare with more recent types. In all probability the requirements of Imperial Airways could be met by fitting constant-speed airscrews, which would enable the engines to give full power on the climb.

DIARY OF FORTHCOMING EVENTS—PAGE 62

NAVIGATION—FOURTH RATE or

Bradshaw-and-wristwatch Aeronautics, Born 1914, Die Hard—But They Must be Killed if Flying is to Become Really Safe : Some Practical Examples of Wrong and Right Methods

By FRANCIS CHICHESTER

AT a conservative estimate, 50 per cent. of the accidents to aircraft in the last five years have been due to bad navigation. I should not be surprised if a careful analysis showed a much greater proportion.

What are the typical aircraft accidents which are reported time after time?

Most frequent is the hillside crash. "Plane flies into side of hill [or mountain, which is even worse]. All dead." Can anyone say this is not due to bad navigation? If the pilot knew where he was, he would know the hill was in front of him. In other words, he did not know his position.

THE author is well qualified to write on his subject. Alone and unaided, he has navigated his way acrosss more miles of ocean than most of us would care to contemplate. In 1929-30 he flew solo in a Moth from England to Australia and then, in the same machine on floats, from New Zealand to Australia *via* Norfolk Island and Lord Howe Island, and subsequently on to Japan *via* New Guinea and the Philippines. He related his experiences in three unusually entertaining books, *Seaplane Solo*, *Solo to Sydney* and *Ride on the Wind*. Mr. Chichester's navigation on the Norfolk Island flight made him the first winner of the G.A.P.A.N.'s Johnston Memorial Trophy—the highest possible recognition of navigational ability. He is now on the staff of Henry Hughes and Sons, the aeronautical instrument specialists. This is the first of several articles on various aspects of navigation that Mr. Chichester will contribute to *Flight*.—ED.

It is true there is a possible case for which the navigator cannot be blamed. The machine is flying blind and just crossing the range when ice or engine failure forces it down; the navigator may know his position within two miles, which is all that can be demanded of him when flying blind, and yet not know which side of the summit he is; but this must be an extremely rare case.

Another case, typical of America, is where the navigator, flying a radio range, has followed a beam reflected from the mountains, and the machine has consequently flown straight into the mountain. Even this is faulty navigation, because the navigator ought not to have relied on one method only, namely, radio; and certainly not on one beam only.

Another cause of hillside crashing is ignorance of a drop in barometric pressure. The pilot thinks he is 800ft. above the summit, but the barometer has dropped an inch and he hits the mountain. This is faulty navigation, because, if he had no means of finding out the barometric drop, he should have taken precautions.

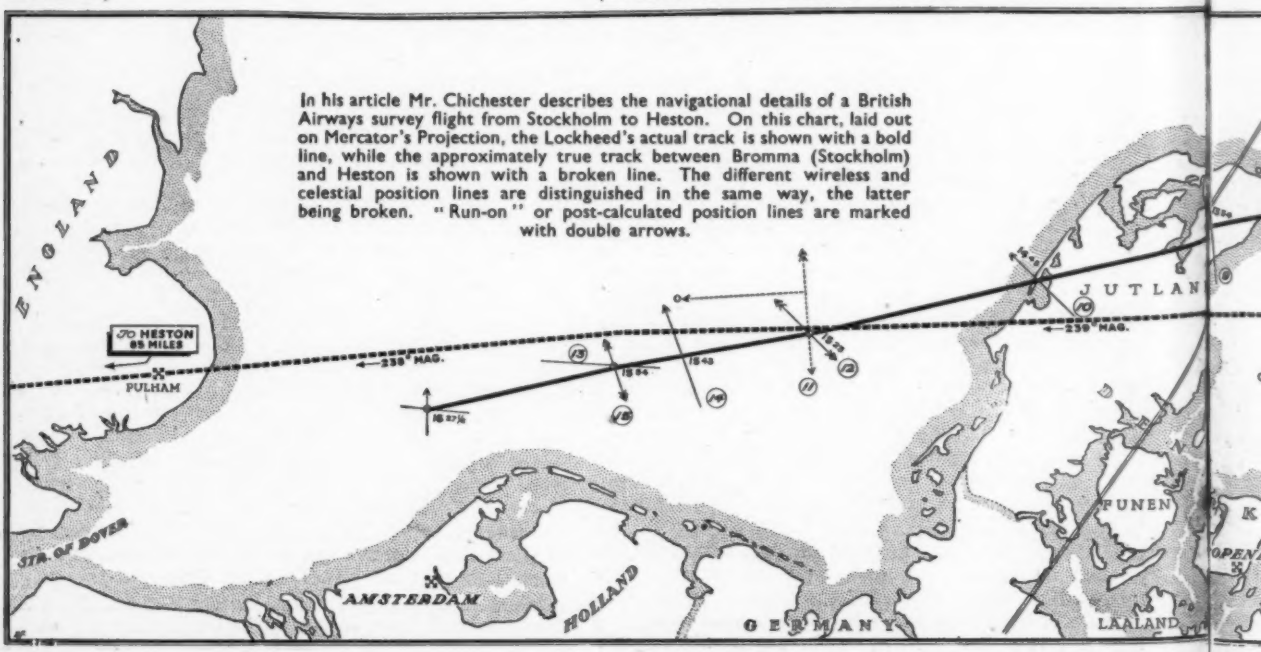
Most hillside crashes, however, are purely and simply bad navigation—the pilot does not know his position.

A similar kind of accident is that when the pilot has been flying above cloud for a distance, does not know his position correctly, and comes down into hilly country where he expected to find low-level flat ground.

Perhaps too much reliance has been placed solely on W/T. direction finding, without a check by D.R. or celestial navigation. Radio beams may be reflected by mountain ranges, refracted by a coast or may fade; and in any case, at the best, can only be expected to give the machine's position within 5 degrees of a line. The trouble is that they give a false sense of accuracy and security; they must be supported by another method.

Far too often we read of a machine completely disappearing. Perhaps wreckage is afterwards found at sea, when the machine never should have been over the sea at all, and certainly not hundreds of miles off its course—as has been known to happen.

Whether the aeroplane has hit a cliff, flown into the sea, or run out of petrol and fallen in, it is the navigation that is to blame. Possibly because of the simplest mistake, such as setting the wrong compass course. It is amazing what howlers can be made. One recalls the two unfortunate Germans in a Junkers who set out from Koepang for Darwin, 520 miles away, and hit the coast of Australia 400 miles off their course to the west.



In his article Mr. Chichester describes the navigational details of a British Airways survey flight from Stockholm to Heston. On this chart, laid out on Mercator's Projection, the Lockheed's actual track is shown with a bold line, while the approximately true track between Bromma (Stockholm) and Heston is shown with a broken line. The different wireless and celestial position lines are distinguished in the same way, the latter being broken. "Run-on" or post-calculated position lines are marked with double arrows.

TE or FIRST CLASS?

Getting lost in bad weather is only too fruitful a cause of accident. A pilot starts off on a simple flight on a fine day. He knows the route well, and cannot be bothered to do more than take the time of starting. He intends making good his leeway at the end of the flight, so does not trouble about finding the drift. He runs into thick, dirty weather; he does not know his exact position when he entered it, or, if he does, is not practised in recording his twists and turns thereafter. He may be driven up blind and then not know where to come down again.

One can also recall only too vividly the losses that have resulted through lack of equipment and ability to land blind in fog, etc., even when position has been known.

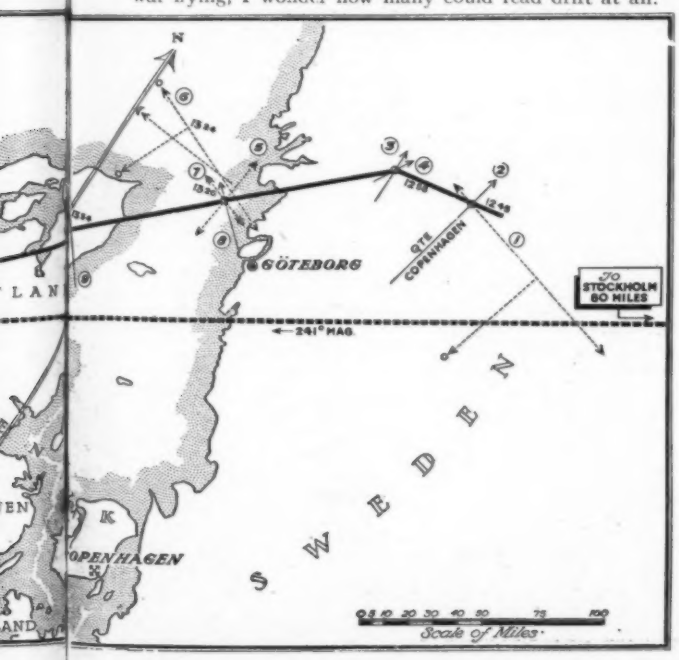
Why is British air navigation in such a state that so many of these types of accident can happen? How is it possible in an Empire with such a marvellous record of marine navigation, which has produced navigators like Cook, Bligh and Shackleton?

Start of the Trouble

To understand it we must go back to the last war. In 1915 there was no air navigation to speak of, and it is easy to understand why: there was scarcely an aircraft compass in existence which was capable of reading a bearing to 20 degrees; nobody understood how to adjust for deviation caused by the various magnetic influences in the machine; and it was no use learning, they thought, because the deviation would be totally different in the air; further, if anyone knew how to check deviation while in flight, he was certainly not going to be bothered doing it—it was quite enough achievement to get aircraft and motor back to the aerodrome, without messing about with navigation.

In any case, no pilot expected to wander much farther than 50 miles from his base, and his pride demanded that he should know that extent of country sufficiently well never to need a compass.

If there was no precise compass navigation there was no object in observing drift to set a correct course, and they did not want to observe it to find out the direction of the wind before landing, because the aerodrome wind-sock would supply that information. If there was the matter of a forced landing and the pilot happened to make it across and down wind, that was just so much more bad luck. And talking to war pilots and reading books about war flying, I wonder how many could read drift at all.



The author (wearing a beard grown by force of circumstances) with his Moth seaplane during one of his long-distance solo flights.

If a pilot flew out of the zone he knew by heart, the machines were slow enough (compared with modern aircraft) to let him watch for and pick up landmarks one by one—roads, rivers and railways. After one glance at a river ahead the pilot could concentrate on looking out for enemy aircraft, whereas frequent glances at a compass would have distracted him.

Finally, what was the use of an accurate compass-course when the machine was almost sure to get into a fight and end up an unknown distance away from it? A very fine pilot, who was flying all through the war, told me the other day that he had never used a compass. The best way to get back was to fly in the general direction of home until the pilot recognised some landmark.

And so a tradition was founded that navigation was a novelty unworthy of a warrior. To fly, fight, shoot straight, and survive crashes was all that counted in an airman.

Naturally, all we younger pilots looked up with awe to the men who had fought in the air under conditions that seem simply terrible to us, in machines that broke up in the air, with motors that frequently failed, and without parachutes; so, when they treated navigation with scarcely veiled contempt, we were inclined to imitate their attitude, and anyone who felt that a little navigation might be a bit of help on a long flight crept off to study it in a locked room with the blinds down.

This tradition that flying and fighting are the things while navigation is only a fad persists to-day, and has done immense harm to British navigation. Indirectly, it has caused a tragic loss of life and a serious destruction of aircraft.

To-day, however, it is at the point of vanishing. It could not survive among airline pilots flying passengers at 200 m.p.h. and no crashes allowed. The time has come when, if a pilot has to make a forced landing and his machine is wrecked because the navigator did not know the position correctly, he is going to be in much the same situation as the captain of a steamer who has lost his ship. And if he has to make a forced landing through no fault of

his own—through engine failure, for example—then the navigator is going to be "on the mat" if he cannot report the position for a rescue party; the one-mile accuracy of the marine navigator will never be required, but, from now on, air companies are going to demand that every navigator shall know the position of his machine within, at the most, five miles during the whole of the flight.

And now let us get down to brass tacks and see what can be done by modern methods of navigation.

On the previous pages is a chart made during a British Airways survey flight from Stockholm to Heston in September, 1938. The flight was not very long—about 870 miles—but it provided a splendid example of practical navigation. All three methods were used, Celestial, W/T., and D.R., and their combined use is particularly well illustrated.

For instance, the aeroplane was in or above cloud and out of sight of land all the time, except for an occasional glimpse through a gap. One such glimpse of a small piece of coastline was obtained, but it would have been useless by itself, and needed to be combined with a celestial observation or a W/T. bearing, and then it gave valuable information. The land seen was narrow, with the sea on one side and sheltered water on the other.

A glance at the chart will show that there are four such strips on the west coast of Jutland—three north of the course, and the fourth an island to the south, all running nearly north and south with the sea on one side and sheltered water on the other, and which would all have appeared much the same through a break in the clouds. A QTE from Copenhagen (10) cut the coast at right angles and fixed the position without any doubt at Lyngvig.

Interesting Factors

What helped to make the navigation so interesting was the fact that the aeroplane got well off its course at the start, due to a rather extraordinary combination of circumstances. To prevent ice formation the electric pitot-head heater was turned on and caused a compass deviation of 23°, which could not be detected without a fix or a check. The machine immediately entered cloud, and an astronomical fix was unobtainable; no radio bearings could be obtained owing to the presence of heavy static; and on top of all this the gyro had been precessing badly since the take-off and could not be used for a check.

In due course, however, the machine emerged from the cloud at 4,000 metres, and the navigator, E. B. Brooke-Williams, formerly a marine officer and an experienced hand with a sextant, immediately took a sun observation (1). At the same time the wireless operator obtained a QTE bearing (2) from Copenhagen. The resultant fix put the machine fifty miles off its course. This was completely unexpected at that moment, when the fact of compass deviation had not even been thought of. The course was held until, thirteen minutes later, QTE bearings (3 and 4) from Copenhagen and Göteborg proved the previous fix to have been exact. The course was then changed accordingly.

It is interesting to note here that, if the static had continued to prevent the operator from getting W/T. bearings, the navigation could have been done equally well without them. The moon was still up; position lines obtained from it, and combined with sun position lines, would have given the series of fixes necessary to reveal the machine's position, its ground speed, and the speed and direction of the wind.

Actually, the moon position line would have been more reliable at this stage than the QTE from Copenhagen. In the fine, still air in which they were now flying, it could have been relied on to within, probably, 2 miles, and certainly 5 miles, whereas a W/T. bearing can never be depended on to within 5°, which, in this case (Copenhagen being over 200 miles away), would have meant 18 miles; even 18 miles is an optimistic estimate, because the signals emitted from the machine's radio had to cross the coastline six times before they reached Copenhagen, and the resulting coastal refraction might have been considerable.

Twenty-six minutes later the navigator did obtain a sight of the moon (5), which was soon about to set, and combined the resultant position line with a sun position line (6), obtained two minutes earlier, and run up (7) for the time of the moon observation. The wireless operator obtained a QTE from Göteborg just before the celestial observations were made, and this bearing, which was accepted as accurate because Göteborg was only a few miles away, and run up (8) to the time of the moon sight and found to pass through the fix. This was excellent navigation, using one method to check the other as a matter of routine, even when one appeared sufficient.

Half an hour later a QTE from Copenhagen (9) cut the track almost at right angles, and thus gave the machine's ground-speed with great accuracy since the time of the sun and moon fix.

In another half an hour they obtained a glimpse of the shore through a gap in the clouds, as described before, and, with the QTE from Copenhagen (10), obtained the fix at Lyngvig. Here the third method was used to check the other two.

At 15.23 hours a sun observation (11) gave a position line cutting the track almost at right angles, thus checking the ground speed again.

The radio bearings available were all coming from the same direction, viz., the north coast of Germany, and therefore not much good for a fix. The Lyngvig bearing was run up (12), however, and combined with the sun position line. This was later verified when a bearing from Pulham (13) was obtained and combined with a cross bearing from Bremen (14) and (15).

The navigation on this flight* was excellent, and illustrates well the latest practice in airline navigation. Four sextant observations were taken in 2½ hours and six radio bearings obtained in the same period. This is in accordance with the practice of British Airways' School of Navigation—that radio bearings and astronomical bearings should be taken constantly, whether required at the time or not: if not required at the moment they can always be run up to make a fix with a later bearing. For example, the sun position line was run up for the time of the moon position line; the QTE at Lyngvig was run up to the sun position-line obtained later, and the Bremen bearing was run up to make a fix with the Pulham bearing.

Three Methods

The flight also illustrates the modern airline practice of combining the three methods of air navigation. The mariner may have four methods available—by soundings, W/T. bearings, celestial navigation, or D.R., but he does not use only one if he is conscientious and skilful; he uses as many as he possibly can. The danger of relying only on one method was well illustrated recently by a captain who made every day the same 200-mile run between two ports across a strait. He got into the habit of taking a line of soundings when he left land, declaring that, so long as the soundings were exactly right, his course must be exactly right. He then crossed a stretch of water by compass only, and for about 500 trips he duly fetched up at the narrow harbour entrance facing him. Unfortunately, one day a heavy storm changed the set of the tides (a fact which was afterwards established) and the ship went on the rocks. Had he not neglected the other two methods of navigating, but made a practice of taking star sights and W/T. bearings in fine weather, he would at least have secured W/T. bearings in the storm, and his ship would not have run aground.

British Airways' Navigation School teaches that on all long-range flights celestial observations should be made at intervals of half an hour; even if they cannot be used, they are good practice for the time when they will be needed. W/T. bearings should be obtained when they can be useful, but not unnecessarily, because of the burden that may be placed on the ground stations. The loop aerial, however, should be used constantly to obtain bearings of W/T. or broadcasting stations within range; while D.R. should be carried on thoroughly the whole time.

* The equipment and personnel of the flight were as follows:—
Aircraft: Lockheed 14.
Wireless apparatus: Marconi ordinary set and short-wave set with rotating loop.
Celestial navigation equipment: Gingrich tables, air almanac, second-setting watch, Hughes Mark VIIIAV averaging sextant.
Personnel: Commanders Robinson and King, Second Officer Nicholson, Navigating Officer E. B. Brooke-Williams, Wireless Operator Woodhall.
The British Airways Chief Navigation Instructor, A. R. O. McMillan, was also on board.

THE ROYAL AERO CLUB

News and Official Notices for *Week Ended January 14*

G.B. and U.S. Draw

GREAT BRITAIN and the United States met in a friendly contest at the meeting of the Council of the Fédération Aeronautique Internationale held in Paris last week, when the destination of the Federation's Gold Medal for 1938 was being considered.

This is the highest international tribute that can be paid for a practical aeronautical achievement. It is awarded once a year.

At the meeting six candidates were put forward. The representatives of twenty national clubs voted, and the feats of Mr. Howard R. Hughes, of the United States, and the leader of the Royal Air Force long-distance flight to Australia were considered to be of equal merit.

The Council therefore decided to make no award for 1938.

It is, however, understood that the President of the F.A.I., Prince Bibesco, has graciously presented two medals to commemorate these two outstanding flights.

Mr. Hughes flew 14,874 miles round the Northern Hemisphere in 91 hr. 17 min., between July 11 and 14, and the Royal Air Force pilots flew from Ismailia to Port Darwin, a distance of 7,158.5 statute miles, between November 5 and 7.

Concession to the Fighting Services

SPECIAL terms of membership of the Royal Aero Club are now being offered by The Committee to serving officers on the active lists of the Royal Navy, Royal Marines, the Regular Army and the Royal Air Force. This concession has been granted as a response to the increased interest taken in air matters by members of the fighting forces.

For these officers election to full membership of the Royal Aero Club is now available at the special rate of £5 5s. a year, with no entrance fee.

Beside the amenities of the clubhouse this confers full air touring facilities upon the member. The Touring Department issues Customs carnets which enable the holders to travel without having to make payments of customs dues on aircraft when arriving in foreign countries, and it supplies information as to air routes, aerodromes and landing grounds and prohibited areas and air corridors. In addition full members of the Royal Aero Club are exempt from landing and take-off fees and are given free housing for their aircraft for periods up to 48 hours in 19 different foreign countries.

Air News

THIS week's news is largely of snow, ice and rain. Advice comes from various parts of Europe of many aerodromes temporarily unfit for use, owing to their being waterlogged or covered in ice.

BELGIUM.—In addition to the anti-aircraft and air firing practice of which notice was given last week, gunnery practice will also be carried out in the *Nieuport-Lombardsyde* area during the period January 16-30.

CZECHO-SLOVAKIA.—The landing area at Prague aerodrome is free from snow and its use by light aeroplanes is again possible.

FRANCE.—Use of the Rheims-Champagne aerodrome by night is prohibited until further notice. This prohibition applies to all aeroplanes other than those stationed at the base.

At *Grenoble* a tract 300 metres long is being made alongside a snowdrift 58 cm. deep. The area of work is marked by a red flag.

Many other aerodromes are also reported unserviceable.

GERMANY.—*Berlin-Tempelhof* and *Halle-Leipzig* aerodromes are waterlogged and are stated to be unfit for use until further notice. The ground at *Breslau* aerodrome is soft and the aerodrome is fit for use only by aeroplanes operating the regular air services.

HOLLAND.—A Netherlands Notice to Airmen states that *Texel* aerodrome has large sections in the West angle of the landing area waterlogged. In these parts the ground has become soft and has been marked by red flags.

Ice covers the landing area at *Eelde* aerodrome and the ground underneath was reported during the week as being frozen hard. Pilots are warned to exercise caution when they are landing there.

D/F apparatus—free from night effect (Adcock system)—has been placed in operation at *Schiphol* aerodrome. This is being used experimentally. In addition D/F apparatus has now been put into service at *Eindhoven* aerodrome for the use of aircraft proposing to land there.

LUXEMBURG.—*Esch-sur-Alzette* aerodrome is temporarily waterlogged.

NORTHERN RHODESIA.—The second edition of the *Northern Rhodesia Air Pilot* is now available and may be obtained from the Commissioner of Police, P.O. Box 203, Lusaka. The price is 12s.

Aviators' Certificates

No.	Name.	Club or School.	Date.
16,839	Patrick Harold Devereux Ditmas	Newcastle-on-Tyne	27.11.38
16,840	Diana Patricia Hutchinson-Smith	Midland	28.12.38
16,841	Dennis Gilbert Dumper	Hampshire	6. 1.39
16,842	Norman Mason Evans	Coventry	27.12.38
16,843	Clifford Ian Craig	Surrey Flying Services	12.12.38
16,844	Athole John Spaldin: Stewart	Strathtay	4. 1.39
16,845	John Aitken Crawford	Strathtay	5. 1.39
16,846	Charles Lawrence Barbezat	University Aero Club	6. 1.39
16,847	Herbert Edward Tappin	University Aero Club	28.12.38
16,848	Colin Derek Joseph Marsh	Cambridge	11.12.38
16,849	John Stanley Littlewood	York and Leeming	5. 1.39
16,850	George Wood	Cotswold	24.12.38
16,851	Cyril Francis Clive Ward	Bournemouth	5. 1.39
16,852	Anthony Challis Hunter	Bournemouth	5. 1.39
16,853	John Sinclair Wreford	Romford	4. 1.39
16,854	Thomas Walter Gostick	Airwork Flying Club	1. 1.39
16,855	Philip Walker	Kent	7. 1.39
16,856	Ronald George Smart	Newcastle-on-Tyne	5. 1.39
16,857	Christopher Carmichael	Bedford	10. 1.39
16,858	Maule William Colledge	Brooklands	6. 1.39
16,859	Maurice Dunn	Hampshire	8. 1.39
16,860	Olivera Rowena Traherne	Cardiff	3. 1.39
16,861	Robert Hudson Rogers	Malling	10. 1.39
16,862	Edward McDonnell	North Staffs	7. 1.39
16,863	Edgar Newhouse	North Staffs	3. 1.39
16,864	Francis Kenneth Faulkner	No. 16 E. and R. F.T.S. (Shoreham)	8. 1.39
16,865	Ivor Roy Cantle	London Air Park	11. 1.39
16,866	John Littlejohn	Strathtay	11. 1.39
16,867	Eric Mervyn Robert Fleming	Portsmouth	28. 9.38
16,868	Charles Frederick Reynolds	Portsmouth	6.12.38
16,869	Algernon Michael Phillips	Hampshire	12. 1.39
16,870	John William Parsons	Bournemouth	12. 1.39
16,871	Arthur Frederick Marshall	York and Leeming	10. 1.39
16,872	Robert Bryan Harrison	County	12. 1.39
16,873	Henry Peter Martin	County	12. 1.39
16,874	Gerald Ingram Thorman	Newcastle-upon-Tyne	12. 1.39

"Flying Wing's" Maiden Flight

LAST Thursday, January 12, saw the first test flight by Clyde Pangborn of the prototype Cunliffe-Owen transport. The machine was up from Southampton for eight minutes, and Mr. Pangborn said afterwards that he was quite satisfied. G-AFMB is now back in her hangar receiving finishing touches and a coat of silver dope before further test flying.

Before her initial flight on Thursday the "Flying Wing" had done two hours of taxi-ing tests. It was expected that she would fly on Thursday morning, but Pangborn found that the differential action of the brakes was still not quite satisfactory. The machine was described in detail in *Flight* of December 22, 1938.

Compact Power

ECHOING the belief which "Indicator" expressed in a recent paragraph, a firm of engineers in the north feel that there will be a future for near-ultra-light aircraft if really suitable power units can be found for them.

The firm in question—the Hayes Engineering Co., Ltd., of Reddish, Stockport—is, therefore, developing two small units which, judging by the drawings, are most business-like affairs with no hint of "conversion" about them. Both are inverted, four-cylinder-in-line, air-cooled units; one develops 40 h.p. and the other 55 h.p.

It is hoped to publish further details when development tests are complete.

FROM the CLUBS and SCHOOLS

Flying and Social Activities : C.A.G. News

LONDON.
LAST week 45 hr. 45 min. were spent in the air. Mr. H. A. M. Woodhatch made his first solo flight and Mr. G. W. P. Hodding completed the tests for his "A" licence.

THANET.
During last week fog alternated with high, squally winds and only 3½ days were suitable for flying. Thirty-one hours were flown, and Mr. J. S. Austen gained his "A" licence.

WESTON.
The weather was very bad indeed and one whole day only was available for instruction, in the course of which 7 hours' flying was done.

REDHILL.
During the week ended January 14 a total of 63 hr. 35 min. flying was returned. Messrs. J. Helme and C. Small passed their "A" licence tests and Mr. T. Woods has gone solo.

IPSWICH.
Two instructors were down with influenza and only 1½ days were suitable for flying. Despite these unfavourable conditions, 16¼ hours were flown, and Messrs. M. J. Lake and G. M. Hitchcock made their first solo flights.

STRATHTAY.
For the first week of January 33 hours' flying was recorded, of which one half was accounted for by C.A.G.s. Mr. Littlejohn completed his "A" licence tests and Mr. D. B. Lindsay made his first solo.

YORK AND LEEMING.
C.A.G. flying last week amounted to 33 hours, and first solo flights were made by L. W. Chatto, K. A. Horner and C. E. Stamp. "A" licences were acquired by Messrs. J. S. Littlewood and A. F. Marshall.

MARSHALL'S.
Under the C.A.G. scheme, Messrs. S. A. Roper and A. S. Cannon have completed their "A" licence tests. The lectures have been very well attended and Mr. G. Wright has joined the club as instructor. Mr. B. P. Wallis passed his "B" licence.

YAPTON.
With 63 C.A.G. members under flying instruction, a total of 39 hours was logged during the last fortnight. Three members have qualified for their "A" licences. Club flying totalled 9 hr. 10 min. over a similar period.

BARTON (BEDS).
Better weather is bringing the flying times back to normal, and a second series of lectures will commence next week. There are still vacancies in the Bedford School of Flying for C.A.G. members. Mr C. Carmichael obtained his "A" licence.

NORFOLK AND NORWICH.
The final of the tennis tournament took place the week-end before last and was won by Mr. and Mrs. Peal. Last Thursday, the club held its children's party. About forty children were present, and Father Christmas put in an appearance just before tea.

ROMFORD.
Facilities have been given by the Romford Flying Club for a "recruiting demonstration" by a local Balloon Barrage unit. It is expected to take place shortly after the Air Defence Cadets have finished drill next Sunday afternoon. About 63 flying hours were logged last week, and Mr. R. H. B. Matthews qualified for his "A" licence under the C.A.G. scheme.

LEICESTERSHIRE.
The fourth club dance will be held in the club house on Friday, February 10, from 9 p.m. to 1 a.m. Tickets are priced at 5s. each, inclusive of refreshments, and may be obtained from the secretary.

PORTSMOUTH.
A total of 29 hr. 35 min. was returned for flying during the fortnight ended January 14. This was achieved by 121 C.A.G. members. In the club section, 15 hr. 10 min. was flown over the same period.

WITNEY.
Weather, as everywhere, has been very bad, and only 94 hr. 45 min. was logged for December. During the first week in January a further 18 hr. 15 min. was put in. The Misses M. Crossley and M. Thring have gone solo.

EXETER.
During the week ended January 10 the weather was indifferent and flying was possible on only three days, owing to low cloud, squally winds and rain. One instructor was ill with influenza. Twelve hours were flown, and Messrs. R. Jordon, H. Foulds and J. F. Ingham made their first solo flights.

PLYMOUTH.
The week ended January 10 saw shockingly bad weather, only 1½ days being suitable for instruction. Thirteen and a half hours were flown, and Mr. F. A. Mason made his first solo flight. There are a number of pupils who will make rapid strides just as soon as the weather will let them.

HANWORTH.
It was impossible to fly on two days of the week ended January 13 owing to bad weather, but 38 hours were ultimately logged. Messrs. J. Cockin, G. Moore, J. Clapham and Miss J. Gordon-Luhrs made their first solos and Messrs. B. Templar and J. Howard completed "A" licence tests.

HERTS AND ESSEX.
The total flying time during December amounted to 213 hours. Incidentally, weather conditions have improved somewhat during the past fortnight and 124-odd hours were logged. First solos were made by Messrs. C. H. Hook and W. Cramer, and "A" licence tests completed by Messrs. Ebsworth and Hills.

BROOKLANDS.
Capt. Duncan Davis has returned from a three weeks' cruise to the West Coast of Africa. In a hotel in Freetown (Sierra Leone) he ran into four old Brooklands pupils; they are operating a Scion Senior seaplane on mail work in conjunction with Imperial Airways. The persistent bad weather greatly interfered with flying at Brooklands during last week. The 1939 competition season is due to commence on February 19 and, as in 1938, the monthly events will be run on a handicap basis, thus giving everyone a fair chance. At the end of the season the Ted Jones Trophy will be awarded for the highest aggregate handicap score.

NOTTINGHAM.
The total flying time for December was 215 hours, chiefly through Civil Air Guard's efforts. One hundred and thirty members of this scheme are now in training at Tollerton, and "A" licences have recently been obtained by Messrs. Bullus, Leaton, G. Hoffen, R. Bass, C. S. Simkins, J. Garton, W. Stokes, P. Sanderson, R. Salisbury and L. I. Cockerham, while several more members have gone solo. Twice-weekly lectures commenced on January 4, and these will be followed by cross-country navigation instruction when the weather becomes finer. Mr. Bernard Collins (late of the County Flying Club), together with Messrs. A. F. Muir and C. A. Mulholland, have joined the flying staff. The club's annual dinner and dance was held at the Black Boy Hotel, Nottingham, last Friday.

Wintering in Bristol

COUNTLESS circuits—with occasional landings for refuelling—were described last Friday evening by members and friends of the Bristol and Wessex Aeroplane Club; but the aerodrome was not Whitchurch and the instructor was not Mr. E. M. H. Slade. Actually, the circuits were under the supervision of Mr. Marius B. Winter (in person, *vide* tickets), whose famous band was providing music for the Club's annual ball at the Victoria Rooms, Clifton.

This year the organisers had decided to dispense with a cabaret show and concentrate on securing a top-notch band—and the wisdom of the decision became obvious as soon as the dance started. Mr. L. R. Williams, secretary of the Club, is to be congratulated on the slickness of the organisation, and the only thing wrong (as at all good parties) was the speed at which the evening went. In less than no time we found ourselves hotelwards-bound—in a special Bristol variety of fog which was causing some anxiety among those who had flown down to Whitchurch for the affair.

C.A.G. in Northern Ireland

IT might be expected that, as the Marquis of Londonderry is, at the same time, Chief Commissioner of the C.A.G., President of the North of Ireland Aero Club and the owner of Newtownards airport, the C.A.G. scheme in Northern Ireland should make rapid progress. More than four hundred applications have been received and another machine, in addition to the two Cadets which are at present used, has been ordered. There are two instructors at Newtownards Airport, the chief being Mr. S. W. Ogden, who is the secretary both of the Northern Ireland Air Guard and of the Club.

Major C. C. Turner

FLIGHT regrets to learn that Major C. C. Turner, air correspondent of the *Daily Telegraph and Morning Post*, had to undergo an operation in hospital on January 5. On Saturday he had a comfortable day, and his condition was stated to be satisfactory.

SERVICE AVIATION

Royal Air Force and Official Announcements : *Fleet Air Arm News : Military Aviation Abroad*

HOUNDS AND HURRICANES: The Puckeridge met last week at the Royal Air Force Station, Debden, Essex. Debden is the home of Nos. 29, 85 and 87 Fighter Squadrons.

A New Command-in-Chief

THE Air Ministry announces the following appointments:—Air Marshal Sir William Gore Sutherland Mitchell, K.C.B., C.B.E., D.S.O., M.C., A.F.C., to be Air Officer Commanding-in-Chief, Royal Air Force, Middle East, with effect from April 1, 1939.

Air Vice-Marshal Charles Frederick Algernon Portal, C.B., D.S.O., M.C., to be Air Member for Personnel on the Air Council with effect from February 1, 1939, *vice* Air Marshal Sir William Gore Sutherland Mitchell, K.C.B., C.B.E., D.S.O., M.C., A.F.C.

Air Comdre. David Grahame Donald, D.F.C., A.F.C., to be Director of Organisation, Air Ministry, with effect from February 1, 1939, *vice* Air Vice-Marshal Charles Frederick Algernon Portal, C.B., D.S.O., M.C.

The appointment of Air Officer Commanding-in-Chief, Royal Air Force, Middle East, marks an extension of the policy inaugurated in 1937 when the status of the senior commanders at home was raised to that of Commanders-in-Chief.

It is felt that the increases in recent years in the strength of the Air Force in the Middle East Command and the wide scope of the Commander's responsibilities, which include East Africa and the Sudan as well as Egypt, Palestine and Transjordan, call for this improvement in status. Certain consequential developments in the organisation of the Command are to be expected in due course.

Gallant Services

THE following rewards in recognition of gallant and distinguished services rendered in Palestine have been published in the *London Gazette*:—

D.F.C.—F/O. (Acting Flight Lt.) Frederick Campbell Hopcroft.

D.F.M.—Sgt. John Onions.

Permanent Commissions for M.O.s

THE following short-service medical officers (states the Air Ministry) have been selected for permanent commissions, subject to medical fitness: Flt. Lts. C. C. Baker, M.B., Ch.B.; J. R. Cellars, M.B., Ch.B.; D. J. Dawson, M.R.C.S., L.R.C.P.; G. B. MacGibbon, M.B., Ch.B.; E. J. Moynahan, M.R.C.S., L.R.C.P.; D. F. S. Shaw, M.B., Ch.B.; J. C. Taylor, M.B., Ch.B.; F. L. Whitehead, M.D., C.M.

Royal Air Force Gazette

Royal Air Force

General Duties Branch

Wing Cdr. L. N. Hollinghurst, O.B.E., D.F.C., is granted the acting rank of Group Captain (unpaid) (January 1); Sqn. Ldr. H. V. Pendavis, D.S.O., is placed on the retired list on account of ill-health (January 1).

Flt. Lt. G. R. Canavan is placed on the half-pay list, Scale B (December 5, 1938).

Medical Branch

Flt. Lt. E. B. Harvey, M.R.C.S., L.R.C.P., is transferred to the Reserve, class D (January 1).

Flt. Lt. E. A. Aslett, M.R.C.S., L.R.C.P., relinquishes his commission on completion of service and is permitted to retain his rank (December 1, 1938).

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

Sqn. Ldr. D. S. Earp, D.F.C. (R.A.F. Ret.), is granted a commission in class CC as Flight Lieutenant (Honorary Squadron Leader) (September 25, 1938).

The following are granted commissions in class CC in the rank of Flight Lieutenant on the dates stated: Maj. D. Hodson (Sp. U.L., I.A.) (July 14, 1938); E. J. Dease (September 26, 1938); Lt.-Col. H. W. Hickey, D.S.O. (I.A. Ret.) (October 12, 1938); Flt. Lt. W. G. Kentfield (R.A.F. Ret.), (October 31, 1938); Maj. R. W. Ellis (R.A.R.O.) (November 8, 1938).

F/O. H. G. Henley, R.A.F.O., is granted a commission in class CC as Flying Officer with the acting rank of Flight Lieutenant (October 3, 1938); Capt. R. H. Spencer is granted a commission as Flying Officer (Honorary Flight Lieutenant) in class CC (October 3, 1938).

F/O. G. G. Dixon, R.A.F.O., is granted a commission in class CC as Flying Officer with the acting rank of Flight Lieutenant (September 19, 1938); F/O. C. W. Halfhide relinquishes the honorary rank of Flight Lieutenant (April 1, 1938).

Owing to the greatly increased length of these lists, as a result of R.A.F. expansion, ranks are confined to those of Flight Lieutenant and above.

Training of direct-entry air observers at the Desford school. Left to right: Sqn. Ldr. G. H. Reid (managing director of Reid and Sigrist), No. 26 (Training) Group, and Mr. George Lowdell (chief instructor); in the centre a pupil is seen at work with map and C.D.C. in one newly enlisted pupils.

Training Sergeant Observers

A RECENT Air Ministry order laid it down that for the future the airmen members of the crew of a multi-seater R.A.F. machine should be full-time crew men. That is to say, they would not work at their basic trade when on the ground. At the same time, it was decided that air gunners should be chosen only from the trade of wireless operator; previously they were often chosen from the trades of armourer and photographer, and sometimes the selection fell upon an aircrafthand (i.e., an airman who does not belong to a skilled trade). Now "aircraft crew" may be said to have become a new R.A.F. trade.

However, the work of the skilled tradesmen on the ground has to go on—in fact, the expansion creates more work than ever for them, and consequently there is a natural reluctance to allow skilled tradesmen to disappear into the air and so be lost for the time being to their trade. One remedy is being sought by the direct enlistment from civil life of young men to be trained as air observer. Fifteen hundred of them are required this year, and the conditions of their enlistment were set forth in a recent issue of *Flight*. Briefly, the age for enlistment is between 17½ and 25. On acceptance, these observers are sent to one of six Elementary and Reserve Flying Training Schools for three months, where they are put through an intensive course of air navigation. The selected schools are Desford, Ansty, Prestwick, Yatesbury, Sywell and Perth. At the end of the three months the observers go to a depot, probably Uxbridge, for a short time to learn the elements of discipline, organisation and drill, and there they are put into uniform. The final stage is six weeks at an observer school, where each man does a course in gunnery and bombing. He must also be proficient at reconnaissance and photography. At the end of his preliminary training of five months he is sent to a squadron with the rank of sergeant and draws 12s. 6d. a day.

Last week the Air Ministry arranged a Press visit to Desford, No. 7 E. and R. F.T.S., near Leicester, which is run by Reid and Sigrist, Ltd. This school is now engaged in training its second batch of thirty direct-entry air observers. A practical demonstration was given, and a number of Ansons were sent off to find their way to given points. The navigation was left in the hands of an observer pupil in each Anson, though an instructor was also there to see that if the pupil's nerves were badly upset by working under the eagle eye of the Press he did not take the machine off into the wilds. One of the said pupils had been working ten weeks before in a chain store and knew nothing of navigation or of the sort of map with which an observer has to work. He was told to navigate to Grantham railway station and was given no information about the wind. He soon found that out for himself, and then handed his instructor an E.T.A. (estimated time of arrival). Once or twice the machine got slightly off the course, but the observer promptly spotted its deviation and gave the pilot directions which brought it back. Triumphantly, he arrived over the railway station exactly at the estimated time, and was also successful on the return flight. The other pupils did equally well.

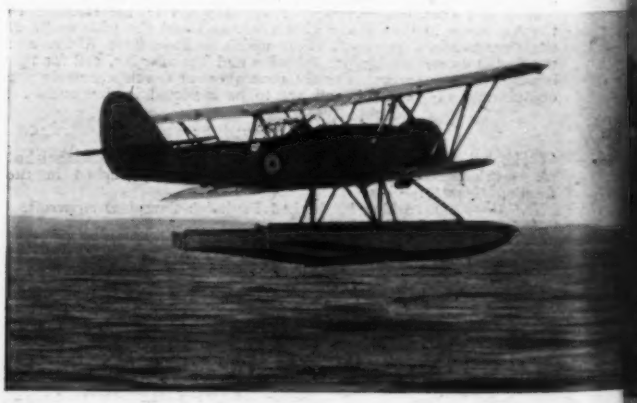
Desford is a very well laid out school and does great credit to the energy and foresight of Sqn. Ldr. G. H. Reid, D.F.C. The quarters of the observer pupils, and also of the short-service pilots who are under instruction there, are comfortable and attractive, and the mess rooms and ante-rooms are bright and cheerful. Expansion is going on there, as elsewhere, and new buildings are almost ready for use. It is understood that the aerodrome, already spacious, will shortly be enlarged. Air Comdre. Sydney Smith, A.O.C., No. 26 (Training) Group, who was present on the occasion of the visit, expressed himself in terms of warm praise about the situation and arrangements at Desford.

The visit made it clear that an observer's job, though a very busy one, is full of interest. The observer must not only navigate, but he must be prepared, and qualified, to take over the work of any other member of the crew (except the pilots) who may be killed or wounded. In fact, all the members of the crew ought to be interchangeable. So the observer must not only navigate, but must be able to aim and drop the bombs and, when attacked, to use the rear machine gun. Young men who wish to apply for this most desirable job should write to: The Under-Secretary of State for Air (S.7.e), Air Ministry, London, W.C.2.

Transfers to Fleet Air Arm

THE Admiralty has decided that officers transferred from the Royal Naval Reserve will be eligible to specialise as pilot or observer in the Fleet Air Arm immediately they have obtained their naval watchkeeping certificates, provided they are then not over 28 years of age.

Royal Marine ranks who are selected for training as rating pilots will retain their R.M. uniform for a period of one month's training, although they will continue to be transferred to the Seaman Branch on commencing training. Class III uniform will be issued to them when they have completed one month's satisfactory training.



A Blackburn Shark III floatplane as adopted by the Royal Canadian Air Force for general-purpose work. The close-up view on the right shows how the wings can be folded with bombs in place. The engine is a Bristol Pegasus IX (785 h.p. max. at 6,500ft.) which drives a wooden airscrew with detachable blades.

"Flight" photographs.

Ltd., who operate the school) with Air Comdre. Sydney Smith, A.O.C. of the Ansons ; and on the right, Air Comdre. Sydney Smith is talking to

The Air Force List

THE January issue of the *Air Force List* has now been published. It can be purchased (price 4s.) from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; 2, York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square, Belfast; or through any bookseller.

Flying Accidents

THE Air Ministry regrets to announce the following accidents:—F/O. Ian Douglas Shields, L.A/C. Gordon Eric Betts, L.A/C. Henry Gilbert Stewart Briggs and Mr. Norman Hector Duff lost their lives in an accident which occurred near Dalry, Kirkcudbrightshire, on January 9, to an aircraft of No. 10 Elementary and Reserve Flying Training School, Prestwick, Ayrshire. F/O. Shields was the pilot of the aircraft and L.A/C. Betts, L.A/C. Briggs and Mr. Duff were the other members of the crew.

Sgt. George Anthony Bell (flying solo) lost his life in an accident which occurred at Derby on January 3, to an aircraft of No. 30 Elementary and Reserve Flying Training School, Derby.

Sgt. Eric James Beer and A/C.2 William Ingram are missing and are believed to have lost their lives as the result of an accident which occurred near Souter Point off the coast of Durham on January 13, to an aircraft of No. 106 (Bomber) Squadron, Thornaby, Yorkshire. Sgt. Beer was the pilot and A/C.2 Ingram the other member of the crew.

SERVICE AVIATION (CONTINUED)

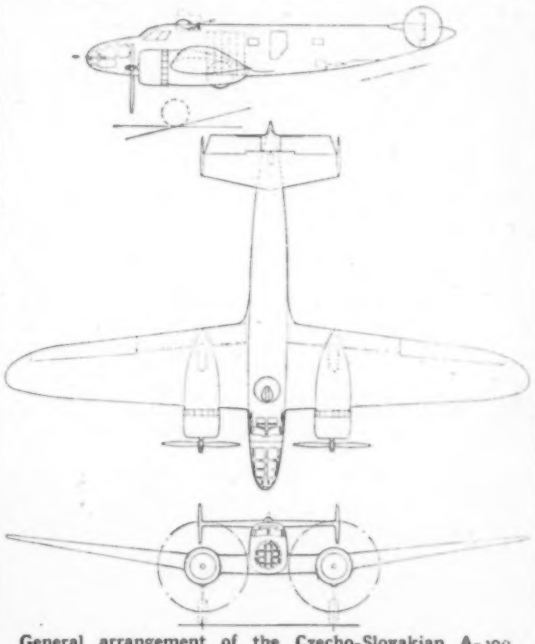
Foreign Service News

A Czech Bomber

ON page 65 of this issue appear first photographs of the Aero A-300, a twin-engined day and night bomber and reconnaissance machine. Of Czech design, this type is of interest because it corresponds to the Blenheim and Dornier Do.17 formula, i.e., comparatively small dimensions, high speed, two fully supercharged engines, and a crew of three. With the same power plant as the standard short-nosed Blenheim (two Bristol Mercurys giving a maximum output of 840 h.p. at 14,000ft.), the speed is claimed to be rather better though the range is shorter. The machine can hardly compare, of course, with the new long-nosed version of the Bristol (295 m.p.h., 1,900-mile range).

The A-300 has a welded steel fuselage with fabric covering, and a wooden, ply-covered wing. The tail unit embodies twin fins and rudders.

There is a movable belt-fed machine gun in the nose with the bomb sight behind. The flooring, which carries the seats and bomb sight, can be dismounted to make way for a camera. Remote controls for the wireless are operated by the observer. Behind the single-seater pilot's cockpit is the upper gun position, which embodies a turret retractable by hydraulic or electric-and-hand power. While the turret is retracted the gunner has a reasonable field of view through a projection in its upper surface. When the machine is used for reconnaissance (or scouting, as the makers call it) there is a third gun position in the floor, the machine gun being attached to the edge of the opening, which is normally covered by a door.



General arrangement of the Czecho-Slovakian A-300 bomber. Photographs appear on p. 65.

All the guns have optical sights. The bomber version of the A-300 carries 700 rounds of ammunition and the reconnaissance version 1,000 rounds.

There is internal stowage for up to 2,200 lb. of bombs. Additional bombs may be carried externally.

Equipped as a bomber the machine will carry its 2,200-lb. bomb load for 560 miles at 70 per cent. of the engine output. The top speed is about 292 m.p.h. at 18,800ft. The climb to 16,400ft. takes 9.04 min.

Climb

IT is reported that a new fighter built by the Curtiss-Wright Corporation (presumably one of the two Allison-engined prototypes now on test) has given the following performance: climb to 5,000ft., 1.6 min.; climb to 10,000ft., 2.8 min.; climb to 20,000ft., under 6 min.; cruising speed at 17,500ft., 300 m.p.h.; and ceiling, 35,000ft. Armour plating is fitted behind and beneath the pilot.

If these figures are correct, the machine has a climb considerably better than that of the standard Hurricane as now in service; the

Foreign Service Aviation (Continued).

Hurricane reaches 20,000ft. in about 9 min. The difference may be largely due to the fact that the Curtiss makes use of a constant-speed airscrew, whereas the standard Hurricane at present has a fixed-pitch wooden type which is, of necessity, a compromise. It may be recalled, however, that at the Paris Show a Hurricane was exhibited with a De Havilland variable-pitch airscrew (two-pitch), and this feature is likely to figure in future production Hurricanes. The Spitfire also is being equipped with a v.p. airscrew.

Reckoning on a basis of armament, all-round performance and flying qualities, the Hurricane and Spitfire can still challenge any single-seater prototype aircraft of any country, and this despite the fact that both are already established in service.

When fitted with one of the new Merlins giving 1,300 h.p. and driving a Rotol or De Havilland constant-speed airscrew, the performance of both types (335 m.p.h. for the Hurricane and 355 m.p.h. plus for the Spitfire) would be very substantially improved, and the climb would probably approximate to, if not exceed, that of the new Curtiss.

Piaggio Potentialities

ON December 30 a Piaggio Pegna bomber with three Piaggio engines left Montecelio aerodrome near Rome and broke two international speed-with-load records. These were: over 2,000 km. with 5,000 kg. load at 403.908 km./hr. and over 1,000 km. with 5,000 kg. load at 405.35 km./hr. This would indicate that the Piaggio concern—in addition to the Savoia and CANT companies—is proceeding with the development of the tri-motor formula.

A standard type in the Italian Air Force at the moment is the Piaggio P.32 Mark II bomber, which has a top speed of 264 m.p.h.

France's Curtiss Fighters

BY this time, seventeen Curtiss P.36 single-seater fighter monoplanes with Pratt and Whitney Twin Wasp engines of 1,100 maximum h.p. should have been delivered to France. The total order is for 100 machines of this type.

"Hundred-hour" Instructional Concession

AN important *Notice to Airmen* (No. 12, 1939), issued last week-end, makes provision for the appointment of "assistant flying instructors" for C.A.G. training by reducing the 250 hours' minimum solo experience hitherto required to 100 hours. The wording of the *Notice* (Editorial comment on which appears on p. 53) is as follows:—

"In order to meet the increased demand for flying instructors consequent upon the formation of the Civil Air Guard, it has been decided, as a temporary measure, to introduce as from the date of this Notice an assistant flying instructor's certificate.

"The qualifications required for the issue of this certificate will be the same as those at present in force for the issue of the existing instructor's certificate, with the exception of the blind-flying qualification and with the modification that a candidate will be required to furnish proof that he has had a minimum of 100 hours in lieu of 250 hours' solo flying experience. The licences of persons who qualify as assistant flying instructors will be endorsed by the Air Ministry accordingly, with authority to give instruction in flying, but this authority will be subject to the restrictions set out in the following paragraph.

"A pilot who is authorised by endorsement on his licence to give instruction in flying as an assistant instructor will be permitted to give instruction only under the direct supervision and control of a fully qualified and authorised instructor who holds a current and valid Class "B" licence. He will not be permitted to give instruction in blind flying, or to send a pupil on his first solo flight or on his first cross-country flight. Such flights may be authorised only by a fully qualified and authorised instructor who holds a current and valid Class "B" licence.

"Before his licence is endorsed, a holder of an assistant instructor's certificate will be required to sign a statement to the effect that he has made himself aware of the restrictions relating to the giving of instruction by assistant instructors, and that he understands that if he acts beyond the limits of his authority it may entail the cancellation of the endorsement on the licence authorising him to give instruction in flying.

"It is intended that the regulations relating to the giving of flying instruction will be reviewed when conditions have become more stabilised."

The Service on the Screen

ON Monday night the New Gallery Cinema, London, resounded to the robust strains of the Royal Air Force Central Band. The Air Minister and distinguished Service personalities made their way graciously to reserved seats. They had been invited to the première of the film *It's in the Air*, made with the co-operation of the Royal Air Force.

They saw a typical George Formby comedy (and let us admit now that Mr. Formby has a certain appeal as a comedian, though it hardly matches his skill with a banjulele); rather less actual flying than is shown in the average half-weekly news reel; a forlorn looking Atlas, a couple of Bulldogs and a civil registered Blackburn B.2 (all very much stationary); one or two speeded-up shots of crazy flying by an Audax (alleged "latest-type bomber"); a morsel of formation flying by Gladiators; and some of the most blatant faking imaginable. The story deals with a young man of questionable brain power successfully masquerading in the R.A.F. and, after a series of practical jokes and flirtatious sequences with a N.A.A.F.I. blonde, culminates with the hero finding himself in the air as pilot of the Audax.

The film will amuse a large number of people and accordingly is to be welcomed in these stern days, but as Service propaganda it is simply not good enough. To be frank, it is pitiful.

We now await a film which shows the R.A.F. in the same light as was thrown on the Army by *The Drum* and *Bengal Lancer*. We want a sound story of adventure and bravery. We want to see the R.A.F. doing a useful job of work; and if we are going to have faking at all we want it up to the standard of the Boeing crash in *Test Pilot*. In short, we want a film worthy of a great Service.

Forthcoming Events

JANUARY.

Thurs., 19th. R.Ae.S. Lecture*: "Corrosion Problems," by A. J. Sidery, A.F.R.Ae.S., and J. W. W. Williamstrop, B.Sc., A.I.C.

Fri., 20th. Southend Flying Club: Supper Ball, Garon's Banqueting Hall, Southend.

Thurs., 26th. R.Ae.S. Portsmouth Branch Lecture: "The Wind Tunnel," by D. L. Ellis, B.Sc., A.R.T.C., A.F.R.Ae.S.

Tues., 31st. R.Ae.S. Graduates' Section Lecture: "Influence of Airscrews on Engine Design." by F. M. Thomas, A.F.R.Ae.S.

R.Ae.S. Isle of Wight Branch Lecture: "Light alloy Manufacture," by R. Worsdale.

FEBRUARY.

Wed.—Fri., 1st—3rd. Aerodrome Owners Association: Airports Conference and Exhibition.

Wed., 1st. R.U.S.I. Lecture: "Air Co-operation," by Group Capt. A. J. Capel, D.S.O., D.F.C.

Thurs., 2nd. R.Ae.S. Yeovil Branch Lecture: "Steel Manufacture," by John Hopcroft.

Tues., 7th. R.Ae.S. Joint Lecture with I.A.E. and others: "Sleeve-Valve Engines," by A. H. R. Fedden, D.Sc., M.B.E., M.I.A.E., M.S.A.E., F.R.Ae.S.

Fri., 10th. Lancashire Aero Club: Annual Dance, Grand Hotel, Manchester.

Thurs., 16th. R.Ae.S. Lecture*: "Ignition Problems," by Dr. G. E. Bairsto, M.I.E.E., F.Inst.P.

Fri., 17th. Cinque Ports Flying Club: Annual Dinner and Dance, Majestic Garden Hotel, Folkestone.

Fri., 24th. York and Leeming Flying Club: Annual Ball, Harrogate. D.H. Technical School: Annual Ball, Hyde Park Hotel, Knightsbridge, 9 p.m.

Tues., 28th. Hampshire Aeroplane Club: Annual Dinner and Dance, South Western Hotel, Southampton.

MARCH.

Thurs., 2nd. R.Ae.S. Lecture*: "Testing Stability and Control," by Ing. A. G. von Baumhauer.

Thurs., 16th. R.Ae.S. Lecture*: "Relative Merits of Carburetters and Direct Petrol Injection," by J. E. Ellor, F.R.Ae.S., and F. M. Owner, F.R.Ae.S.

APRIL.

Thurs., 20th. R.Ae.S. Lecture*: "Possible Steel Developments," by Dr. T. Swinden, F.R.Ae.S.

MAY.

Thurs., 4th. R.Ae.S. Lecture*: "Strength of Thin Metal Construction," by H. L. Cox.

Sat., 20th. Empire Air Day.

Thurs., 25th. R.Ae.S.: Wilbur Wright Memorial Lecture, by Dr. G. W. Lewis.

JUNE.

Sat., 24th. Royal Air Force Garden Party, Trent Park.

JULY.

Sat., 8th—Sun., 23rd. Brussels Aero Show.

* All these lectures take place at 6.30 p.m. at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1.

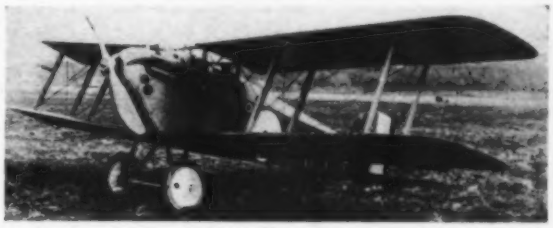
R.A.F. Units Visited

No. 90 (B) SQUADRON

By MAJOR F. A. de V. ROBERTSON, V.D.

(Illustrated with "Flight" Photographs)

"In the air the Blenheim looks quite different. It is slim and lean and purposeful."



"One scarcely dared to mutter the word 'Dolphin' much above a whisper, and visiting officers used to peer cautiously into those sheds, and come out muttering *'Back stagger!'* in tones of awe."

EARLY in 1918 Shotwick (now named Sealand) was in course of construction as a station of the R.F.C. German prisoners were busily engaged in erecting hangars, some of which were roofless; yet the air mechanics had somehow or other to rig machines and fit engines in the cold January days, whether their fingers froze or not. But inside those hangars which were finished stood some hush-hush aeroplanes waiting for their engines. One scarcely dared to mutter the word "Dolphin" much above a whisper, and visiting officers used to peer cautiously into those sheds and come out muttering *"Back stagger!"* in tones of awe.

The plain facts of the case were that three fighter squadrons (they called them "scouts" in those days) were being formed at Shotwick to go to France with Sopwith Dolphin aeroplanes, and one of them was to be numbered 90. In due course No. 90 Squadron was actually formed, but before it started for the front the authorities changed their minds. The squadron was disbanded, and the pilots and Dolphins were sent to other squadrons. The other two Shotwick squadrons were never formed. Perhaps the troubles experienced with the 200 Hispano had something to do with this decision.

There seems no reason for connecting the present No. 90 (Bomber) Squadron with this abortive episode in 1918. It is really preferable to regard No. 90 B.S. as a new formation in March, 1937. What does it matter that it has no war records? That does not in the least affect the spirit of the present officers and airmen of the squadron. Their frame of mind is that if any foreign nation is so misguided as to attack Britain, No. 90 B.S. will set about creating war records for itself without any delay, and the creating of them may prove a very unpleasant process for the said enemy.

The story of the squadron's birth is as follows: In March, 1937, No. 101 (Bomber) Squadron was stationed at Bicester Aerodrome. That squadron is an old friend of *Flight's*. Our first visit was paid to it in April, 1931, when it was stationed at Andover and was flying Sidestrands. An account of that visit is included in the *Flight* book, *Squadrons of the Royal Air Force*, and the photographs of the Sidestrands in formation have travelled about the world as widely, probably, as any air photographs have ever done. In 1937 No. 101 B.S. had exchanged its Sidestrands for Overstrands when it was ordered to detach a flight to form a nucleus of No. 90 B.S., and it did so, the flight being under the command of Flt. Lt. P. G. Heffernan, of the Royal Australian Air Force. A month later Sqn. Ldr. E. Burton took over the command, and the squadron was gradually brought up to strength. The new formation did not deprive its parent of any Overstrands. It formed with Hinds, but only for a few months did it keep them. In May of the same year it began to receive Blenheims, and presently they came along in a steady stream until the

A life on the rolling sward—pilots of No. 90 demonstrate the "launching" of the automatically inflated dinghy carried in each Blenheim. A static line starts inflation by CO_2 as the dinghy is thrown overboard. Blenheims have sealed fuselages and wings, so can remain afloat for a considerable time in the event of a "ditching."

b

(Left) An aerial impression of some of the Blenheims of No. 90 (B) Squadron in formation.

establishment was complete. It was one of the first squadrons to be equipped with this speediest of all medium bombers.

Technical descriptions of the Blenheim have already appeared in *Flight*, and there is no reason for repeating technicalities here. It will be sufficient to recall that when the Bristol Company produced this mid-wing bomber as an improvement on a low-wing monoplane designed and built to the private order of Lord Rothermere, it created no little sensation in the aeronautical world. A top speed of 280 m.p.h. with military load was something of an achievement—though we are now seeing a new version which is faster by some 15 m.p.h., and has had its range increased from round about 1,000 to 1,900 miles. The new Blenheim has a long nose, which considerably alters its appearance. The existing excellent machine certainly has a curious appearance when on the ground. It seems to have a definite face nestling between its two Mercuries, but it is the face of some creature out of the poem "Jabberwocky"—it is not a slithy tove, certainly not a mome rath or a jub-jub bird, nor even a borrogrove, but it is something weird. The Blenheim nose, I am told by technical experts, makes up in virtue for what it lacks in beauty, and even contributes its quota to the total lift of the machine.

Businesslike

In the air the Blenheim looks quite different. It is slim and lean and purposeful. Head on, it almost disappears from sight, and the enemy pilots who tried to spot its approach would need keen eyes. Of course, it would look even better if the wheels retracted completely instead of showing a little quadrant down below (albeit a useful one in emergency). And why, oh! why, does the tail wheel not retract? There is room for it inside, but the awkward-looking little thing hangs down below and mars the streamline shape.

The cockpit of the Blenheim is pleasantly warm on a cold day. In summer the sun beats down rather fiercely through the transparent roof, and pilots have been known to fly wearing panama hats.

No. 90 B.S. is devoted to the Blenheim. It is, the pilots say, a very fine aeroplane, and they ought to know. The pilots who fly it are themselves very good. Like most other squadrons to-day, No. 90 depends mostly on very young pilots—pilot officers and sergeant pilots. The C.O. confirms what other squadron commanders have told *Flight*, that the present output from the Flying Training Schools is excellent. better, in fact, than ever before. The present course of training, which starts in civilian schools and ends in the Advanced Training Squadron at an F.T.S. takes only ten months, but it has very good results. The officers when they join their squadron can not only fly well, but they know something about station duties. In fact, they can join in full squadron duties so soon as they have learnt to fly the type with which the squadron is equipped. None of them arrive with experience of flying Blenheims. They may have been on twin-engined types at their F.T.S., but those types would, of course, be Ansons or Oxfords.

So the first thing to do with newly arrived pilots is to give them instruction on the Blenheim. First of all, No. 90 B.S. insists on each pilot learning by heart the sequence of operations before taking off and after taking off. He not only has to learn it, but he must practice it until there is no chance of his doing anything wrong or out of order. To go through that sequence correctly must become a second nature to each pilot. It usually takes only from two to two and a half hours' dual instruction to train the new pilots on Blenheims. Likewise, No. 90 B.S. holds that a pilot is no use to the squadron until he can fly automatically and without thinking about it. Many of the public seem to think that flying is the end and object of R.A.F. work; actually it is scarcely the beginning of it.

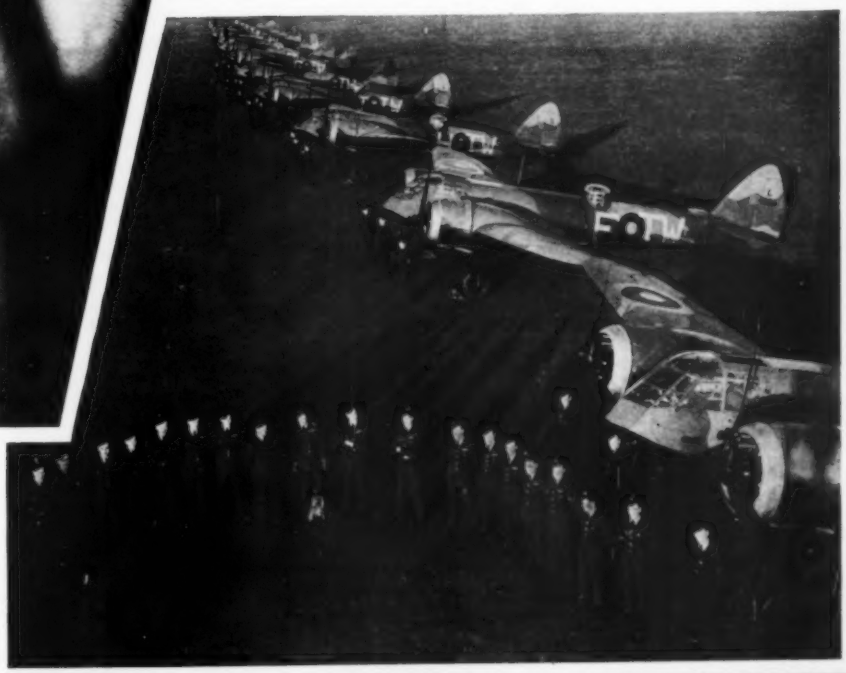
In present conditions there is every incentive to a short-service officer to identify his whole existence with his squadron's type of aeroplane. When he leaves his F.T.S. he has before him only about three years on the active list. In all probability he will spend all that time with one squadron and, therefore, he does not really need to worry about more than the one type of machine. When the short-service commission lasted for six years, officers were transferred from squadron to squadron with great frequency. The policy was then that as many officers as possible should have experience of as many types of machine and as many classes of squadron as possible. That has now been changed, and of necessity. Only the per-

manent officers have that sort of prospect before them. No. 90 B.S. had at the time of *Flight's* visit only two officers with permanent commissions, the Squadron Leader (who came from the Cambridge University Air Squadron) and another. The squadron roll consisted of one Squadron Leader, one Flying Officer and fourteen Pilot Officers. Incidentally, all of them except the C.O. were bachelors.

The keenness of all the pilots is a notable feature of No. 90 B.S., though it has no monopoly of that quality in the R.A.F. Flying is not only their work but also their recreation. Usually, each pilot gets about 20 hours a month of duty flying, but at week-ends there are often calls for volunteers to fly over posts of the Observer Corps and give them practice, and the 90 Squadron pilots are always ready to volunteer for such jobs. Men may be accounted lucky when they earn their living by indulging their hobby.

Bicester station is a pleasant place on a fine day. The only thing against it is that the aerodrome is on the small side. Though the station has been in existence for some ten years, building is still in progress, and one new and very fine modern hangar has recently gone up. That is because originally the station only accommodated one squadron and now it has both No. 90 and No. 101 B.S. Work is also proceeding on the various messes and quarters. The married officers' quarters are quite of the latest design, and it is reported that ladies find them most convenient and easy to run. The red brick in some of the new buildings is of a pleasantly dark shade, which is a relief to the eye after the staring, flaring brick of some aerodrome erections. Creepers are beginning to spread over the walls, and they, too, add to the homely appearance of the place. One does not have to walk or drive for miles to get from the aerodrome to the living quarters. Bicester town is a small place, but Oxford is only about a dozen miles off, and is well equipped to provide healthy recreation for young men when they want to get away from the atmosphere of their work.

(Above) Decorative effect — three Blenheims seen through the bomb aimer's window of a fourth.



(Right) "What! Will the line stretch out to the crack of doom?" (Macbeth)—Some of the Blenheims of No. 90.

(Right) Some of the officers of No. 90: (left to right) P/O. T. A. Cox, P/O. D B. Gericke, F/O. D. R. Biggs, Sqn. Ldr. G. J. C. Paul (C.O.), F/O. G. L. B. Hull, P/O. C. S. Kemp.

Topics of the Day . . . by "Indicator"

THE PASSENGER is FRIGHTENED

"Flight" photograph.

THE effect of heavily subsidised international competition on the design of transport aeroplanes is very similar to that of a major war on the design of military types. To a less marked degree, but, nevertheless, noticeably, speed and performance generally tend to be given a higher place than safety.

It will probably be true to say that the present ideas on transport performance reached a peak during 1938, and the operators—not to speak of the unfortunate passengers—have now seen the red light. For the next year or two it is unlikely that performances will improve to any great extent at the upper end of the speed-range and designers will concentrate, after a lapse of a year or two, on the more important point of safety—particularly safety in take-off.

As one talks to airline passengers, whether lay or expert, it is becoming more and more obvious that they have had enough of sheer technical development and would often welcome a return to the old days when transport machines left the ground after a three-hundred yards run and climbed like a kite on a string. The modern type just plainly frightens them. Some of these aeroplanes take every bit of eight hundred yards to unstick, and thereafter the climb, until the undercarriage has been retracted, is ludicrously flat. For thirty seconds after the wheels have left the ground hardly one occupant of the machine could survive if an engine failed—and that is a state of affairs which should not be tolerated with any public transport devices in 1939.

Subsidising Speed

ON the whole, subsidies have done air transport a bad turn, though it is hard to see how this essential public service could have carried on without some form of assistance. If it had only been a matter of payment by results the result might not have been so bad, but, for the last few years, all the world's transport companies—with the possible exception of Imperial Airways, who have been largely trounced by their backwardness—have been uneconomically competing with one another in the speed race; and there have been far too many accidents.

This may be taking a somewhat pessimistic view of the entire situation, but one cannot help thinking that, left more to itself, air transport might have developed on far different lines. The fact that the flying machine can and will be an extremely useful and rapid means of transport has sometimes been overlooked by those who think of the air transport industry only as a powerful item in the bulwark of international "prestige." To point a moral, it is the old business of pride cropping up again, by which a man becomes so full of himself and so bristling with inventions that he proceeds to exterminate himself.

Part of the trouble is that most of us have a passion for mechanical things, and the present-day transport aeroplane really is the most beautiful piece of mechanism, in which thousands of essential items contribute towards its operation. Unfortunately, one new device has led to another, and all sorts of things like flaps, v.p. airscrews and retractable undercarriages have been used solely to increase the performance at the upper end, leaving the stalling speed, take-off run and climb rather worse than they were before.

All the time, too, airline operators and pilots are trying to do just a little too much. As new radio facilities are provided, these are used not so much to make flying safer in weather conditions which were previously thought to be just possible, but to enable services to be run in weather which would simply not have been considered five years ago.

One or two major accidents during the 1936-7 winter gave the operational departments of the different companies something to think about, and some of them realised then that they were attempting to run before they could walk. Nevertheless, it is an unfortunate streak of pride with a few pilots and operations departments to make a point of getting through while the others remain on the ground.

This is all very well with mail-carrying services, but it is not good enough when passengers are aboard. With very careful training and steady practice in all conditions, it is possible nowadays to fly in practically anything. But sooner or later one item or another in the extensive equipment (including the pilot's skill) breaks down and then there is nothing left on which to fall back. Radio equipment *does* fail; ice layers cannot always be avoided; and even fuel systems are not perfect.

The Wrong Attitude

ANYONE who has lived for a few hours in the control cabin of a really up-to-date machine realises that the instrumental and control complications are more apparent than real. These are not the cause of the trouble. Such complications merely increase the time taken for pilots to be fully trained on the new type. One American company has said that the cost of training their pilots on a new fleet amounted to ten per cent. of the actual first cost of the equipment itself.

So far not very much standardisation has been seen in control layouts and the effect of a change-over from one machine to another has been described by Mr. Ben. O. Howard, of United Air Lines, as similar to a rearrangement of the keyboard on a typewriter. Even if the new arrangement is, in actual fact, an improvement on the old one, mistakes would be frequent during the first week of use.

Neither has flying quite grown out of its heroic stage. The majority of transport pilots take their work very seriously, but it is inevitable that at least a section of the younger pilots should be recruited from a Service which, by its very nature, does not encourage a steady and cautious outlook. This must be demanded of those with responsibilities as heavy as are now being carried by the commanders of forty-seaters cruising at anything up to 200 m.p.h. in all weathers.

As yet, flying still attracts the adventurous type who always tends to have a "that'll-be-all-right-you'll-find" attitude towards things in general. So long as air transport remains even slightly more dangerous in comparison with other means of locomotion, this type will continue to be attracted. Until transport flying is universally looked upon as a serious and important career, things will remain as they are; and until it shows a safety factor of the hundred-per-cent. order, it cannot be looked upon in that light. This is a vicious circle which must be broken.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

ROLLING

A Moth Owner's Opinions

MAY I be allowed to reply to "C.A.G. 811's" letter in *Flight* of January 5?

There is no reason whatsoever why a Moth should not be safe to flick roll, flick half-roll or slow roll—provided, of course, it possesses a current C. of A.—for as long as one wishes. Of the 500-odd hours that my Moth has done I am not exaggerating in saying that at least 200 of these have comprised flick rolls—a much harder strain that a flick half-roll—on a machine nearly ten years old! The last flick roll took place yesterday, I may say.

In regard to his mechanics and instructors, I can only say that the former can have no confidence at all in their own work; in the latter, their ignorance of aerobatics (which is a deplorable thing) must be the reason for their timidity.

Figures of loading in a spin as against a flick roll I fear I cannot give as I am only a pilot, but I can safely say that the reason a flick roll or flick half-roll is a greater strain on a machine than a spin is that one pulls a machine gently up into a stall for a spin—letting the machine start its spin in its own time. But for the two rolls one is doing anything between 70 and 80 and one has definitely to pull the machine up and out of its course, and pretty firmly, too, which is quite plainly a more "straining" action. Risk of breaking? None at all, for the constructors know best and would not tell one there is no danger (as they did me in 1929) if there was even the slightest bit. Why, our war machines stood up to this treatment with a full load of guns and ammunition, as I can vouch for on the Camel and Snipe from personal experience, with a slightly lower factor of safety than a Moth.

I am willing to meet and demonstrate to "C.A.G. 811" *my* confidence in the Moth at any time. F. S. SYMONDSON.

Colyton, Devon.

Another View

WITH reference to the query raised by your correspondent "C.A.G. 811" in *Flight* of January 5, about not being able to roll or flick-half-roll a Moth, the reasons are these:

(1) As the Gipsy Moth has a wet-sump engine it would be most unpleasant to turn the machine upside down, as all the oil would immediately pour down into the cylinders, and create an unholy mess!

(2) Flick rolling is "not done" because it places a great strain on the machine itself. It can be done, of course (and I have done it several times on both Moths and Harts, without evil results), but "the pitcher can go too often to the well"!

London, S.E.4. D. A. S. MCKAY, Sgt. Plt., R.A.F.V.R.

BRITAIN'S AIR STRENGTH

What an American Thinks

BEING an old reader of *Flight* and an American, I wonder if you want some American hoss-sense criticism.

The British airplane production situation strikes me as being rather of the "feeling-very-sorry-for-yourself" type, and honestly, in my opinion, it will never keep Britain to the fore as an air power to be reckoned with. From several sources of information, I understand that the Germans produce more planes than the total production of France and England combined. I know that English engineers and technicians aren't any dunces, so why can't England at least equal Germany's output?

Tactics and strategy which might be employed suggest that this deplorable situation means brutal and total paralysis of English industry in time of war, which in turn means hunger and death of the population.

Again, I wonder if you have considered just how effective your balloon barrages *actually are*. In my opinion, of *no use at all below* 20,000*ft.*, the effective mass bombing altitude. As you will recall, there was a system of anti-aircraft firing developed during the World War, namely, the system of boxing or squaring. Have you ever considered the effectiveness of this system when applied to bombing? Now where are your balloons? Are they effective against this technique? Do you propose to use them as cushions to catch these bombs?

No, all your balloon barrages won't do you a bit of good; the only thing that will, will be an instantly available force of one to three thousand pursuit airplanes capable of actually manœuvring at 35,000ft., of a speed in excess of 375 m.p.h. at 20,000ft., of firing at least 8,000 rounds per minute of fifty-calibre ammunition directly forward, of taking-off with 1,000ft. run, of landing at 50 m.p.h., of climbing at 4,000 ft./min., of power diving at 450 m.p.h., and of pulling out sharply, and capable of being produced at a rate of at least 500 aircraft *per month*, minimum.

Technical difficulties appear to be almost negligible. Then, again, perhaps your technique of production is different. Should this be the case, why not try changing the technique to suit the problem?

Another point which should be considered is that pursuit machines should have a duration of at least from five to six hours, and preferably in excess of ten hours. This is tactically of high importance, for such a fighter can force the enemy to continue combat until his tanks are empty and then cause his destruction by gunfire. Should the enemy start a running, retreating fight, manœuvring will be simplified, for the gunnery problem will resolve itself to direct-course sustained fire, long- or short-range.

England, properly armed in the air, is actually impregnable to mass attack if she disposes of her air power in a wise manner. The law of military averages as applied to aircraft can be turned to her advantage, provided she stops pussy-footing and settles down to the serious business of manning her Air Force and solving her production riddle. Whatever her potential enemies can do, England can also do and surpass.

New York. C. T. ERICKSON.

R.A.F. AGE LIMITS

C.A.G. Trainees as Observers?

A FEW weeks back I ventured to ask why the age limit for flying in the R.A.F. was so low as 25, and why the observer's limit should not be increased to 32 in order to give these "old" men a chance.

Now that 1,500 half-wings are wanted, why not take the willing C.A.G. males that have obtained "A" licences and put them in the R.A.F.?

Why not take all "A" licence C.A.G.s and make them airmen pilots in the V.R. and train them on Service lines? After all, we presume the scheme was started to obtain pilots quickly.

Leeds. H. WILLIAMS.

[As readers will have seen from last week's issue (our correspondent's letter was written earlier), a scheme to bring the C.A.G. more closely into line with Service requirements is now in motion.—ED.]

FLYING FREEDOM

Do Clubs Exaggerate Difficulties?

READING through a society journal recently, I noticed a paragraph under the above heading asking: "Is private flying free?" and answering "No, no, a thousand times no." A statement like that is very damaging to private flying, however subsequently qualified, and as an enthusiast for private flying with *freedom*, I resent it.

Although the contributor deals mainly with the construction of aeroplanes, the statement is hopelessly inaccurate. He states that before he can make or get somebody else to make an aeroplane, he must study "multifarious documents" and "pay innumerable people innumerable fees" before he may take the aeroplane into the air. He appears to forget the large numbers of those who have built "Flying Fleas" and other aeroplanes to their own ideas, and have flown them too, the Air Ministry giving the necessary permission to fly when the enthusiast produces a third-party policy for public protection.

My club has built and flies an aeroplane with a tricycle undercarriage entirely from our own ideas, and it is successful in every way. *No fees were paid to anybody*, except for insurance and registration.

In actual fact, there is practically no place in the world where flying is so free as in this country. Anybody wishing to buy an aeroplane may do so. There are no difficulties (other than financial, and we can provide a serviceable aeroplane for less than £100!) which are formidable. The agent or manufacturer will attend to the registration and insurance for you, and

CORRESPONDENCE (CONTINUED)

getting a licence to fly it and carry passengers is a simple matter. There are no restrictions other than those dictated by common sense, and you may fly just when and where you wish by night or day, and land where you please.

The main trouble with private flying and flying freedom is that the source of information for the novice pilot is from the club instructor, who in turn is governed by his employers, and they, to justify high charges or to make themselves appear important, magnify the regulations, difficulties and taboos to such an extent that flying loses a lot of its attractions. Another trouble is that so many clubs have always had the same old box-kite-type of aeroplane with weak legs, and produce all sorts of fantastic arguments against buying the modern type of cabin side-by-side aeroplanes which we use, and which makes the old type of flying crate appear a death-trap by comparison.

It is a pity that there are not more clubs like ours, which is established on a private ownership basis so that members can use an aeroplane as a private car to visit their friends. Out here in the country it is usually possible to land within a quarter of a mile of one's goal, and rabbit holes are not noticed by the undercarriages of any of our aeroplanes.

There is much talk about the tests for flying licence being made more difficult, and the Civil Air Guard scheme will do much to foster such ideas. There are many things which are particular to the Civil Air Guard pilot, so why not a Civil Air Guard test for a Civil Air Guard pilot's licence, which could be made just as difficult as desired by those who are promoting such talk. Then private flying will still remain as simple (and private) as it is now (for those who go to the right place to find out) and true flying freedom will still prevail.

Ely, Cambs. H. R. DIMOCK,
Ely Aero Club.

THE PILOT'S "A" LICENCE

Passenger Carrying Ability: A R.Ae.C. Certificate Suggestion

APROPOS to Indicator's remarks (December 15) on the inadequacy of the "A" licence flying tests and the need for modification of the licence requirements; while modification of the "A" licence presents difficulty owing to its international character, it may be of interest to your readers to know that in British India there is a rule which forbids the carriage of passengers by an "A" licence pilot until he has completed 25 hours solo and has been certified as competent to do so by a duly licensed pilot instructor. As part of the *ab initio* flying training course, pilot instructors are advised that the pupil should have successfully undertaken a short cross-country flight, making a landing at an aerodrome which is strange to him, before being granted the passenger-carrying certificate.

A rule of this nature should remedy the position to which "Indicator" draws attention. Additional legislation is always troublesome, however, and as a simple expedient it is suggested that the conditions of issue of the Royal Aero Club Certificate be amended so as to be the hall mark of a safe and reliable private pilot.

It would probably be argued that to make the R.Ae.C. Certificate more difficult to obtain would entail a loss of revenue, particularly now that there are so many C.A.G. candidates. This would be a short-sighted view, in my opinion, as the R.Ae.C. Certificate is at present an unnecessary duplication of the essential "A" licence. To modify its conditions of issue would give it real meaning, and a new lease of life. G. L. GANDY.

Brockenhurst, Hants.

SHORT-CIRCUITING THE PILOT

A Landing "Prophecy"

TOUCHING upon the interesting speculation in your editorial columns as to the best method of effecting a safe landing with the really big airliners of the future, may I make the following suggestion, or prophecy?

Within the next couple of decades the whole landing operation will be carried out by the ground control.

The pilot will fly to a given point at a set speed, and height, and will then relinquish the controls, which will be "picked-up" from the ground by a radio system somewhat similar to that at present employed on Queen Wasps. The final approach, and actual touch down, will be automatic in the sense that all relevant data will have been obtained by a series of tests, and their application to the best advantage worked out in advance. Blind landings, with visibility nil, should be not only possible, but 100 per cent. safe. JOHN V. HEWES.

Ashtead, Surrey.

Empire Air Day: May 20

EMPIRE Air Day, which usually takes place on the last Saturday in May, has been fixed for slightly earlier this year; Saturday, May 20, is the date.

Last year sixty Service aerodromes, in addition to thirty civil ones, were open to the public. This year, owing to the continued progress of R.A.F. expansion, it is likely that the number will be even larger. The event will be the sixth of the series.

New Lodge Plugs

NEW models of Lodge aero plugs are now available in 12 mm., 14 mm., and 18 mm. thread sizes, with screened fittings for conduit-type harness or metal-braided cable terminals, to interchange with the American and European type couplings. The new plugs and the existing range are described in a new leaflet recently issued by Lodge Plugs, Ltd., Rugby.

Taylorcrafts at Ratcliffe

SIR LINDSAY EVERARD, M.P., is letting the Taylorcraft Aeroplane (England) Co., Ltd., use Ratcliffe aerodrome for flight-testing their C.A.G. machines which, it is expected, will soon be produced at the rate of five a fortnight.

Sir Lindsay's personal pilot, F/O. A. H. Hole, who has been at Ratcliffe for two years, is shortly leaving. He was in the Service in Egypt, Transjordan and at Manston, and flew Sir Lindsay's Vega Gull in the King's Cup Race in 1937.

Olympic Gliding

THE first official inclusion of gliding in any Olympic Games has been arranged by the Finnish Organising Committee for next summer, when the twelfth Olympic Games will be decided in Finland.

The competition will not take place at Helsinki but at the Jämijärvi gliding school, four miles from the village of that name. It is a three hours' run from the capital. Rules governing the event will be confirmed by the F.A.I. in Paris this year.

To-night's R.Ae.S. Lecture

TO-NIGHT, January 19, Mr. A. J. Sidery, Assoc. Met. (Sheffield), A.F.R.Ae.S., and Mr. J. W. W. Willstrop, B.Sc., A.I.C., will read a paper before the R.Ae.S. on "Some Corrosion Problems relating to Modern Aircraft."

The authors will deal with the effect of heat treatment on the corrosion-resistance of aluminium alloys, the effect of reheating on the corrosion properties of duralumin, the behaviour of aluminium alloys under stress/corrosion conditions, the influence of fuels on metals and alloys, organic protectives, joints and jointing materials, riveted joints, radiator corrosion problems, reduction of glycol corrosion by inhibitors, and flight tests with glycol-cooled engines.

The lecture will be delivered at 6.30 p.m. in the Lecture Hall of the Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W.1. Non-members will only be admitted by ticket, obtainable through a member.

Over Fifty Airports Exhibitors

OVER fifty firms have taken stand space at the Airports Exhibition, to be held at the Central Hall, Westminster, on Wednesday, Thursday and Friday, February 1-3. Two years have elapsed since the last Exhibition.

The show will be held in conjunction with the annual Airports Conference of the Aerodrome Owners' Association. It will not be open to the general public, but a large number of trade invitations are being issued by the A.O.A. from their offices at 32, Savile Row, London, W.1.

The customary banquet will be held at Grosvenor House on February 1, when Capt. Harold Balfour, Under-Secretary of State for Air, will be the principal guest and Lord Londonderry will preside.

Current during the Exhibition period, a special Airports Number of *Flight* (February 2) will be published, containing an advance review of the exhibits and special features of interest to Exhibition visitors.

MODERN CZECH ARMAMENT

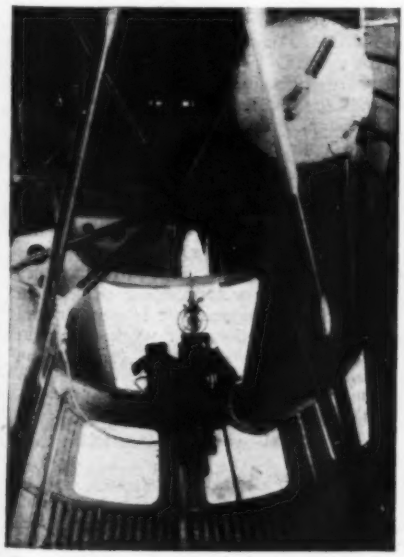
Close-Ups of a Fast New Bomber : Two Bristol Mercury Engines

In view of the restrictions on the publication of photographs of the armament of new British service types these views of the Aero A.300 are of special interest. Further information appears on page 61.

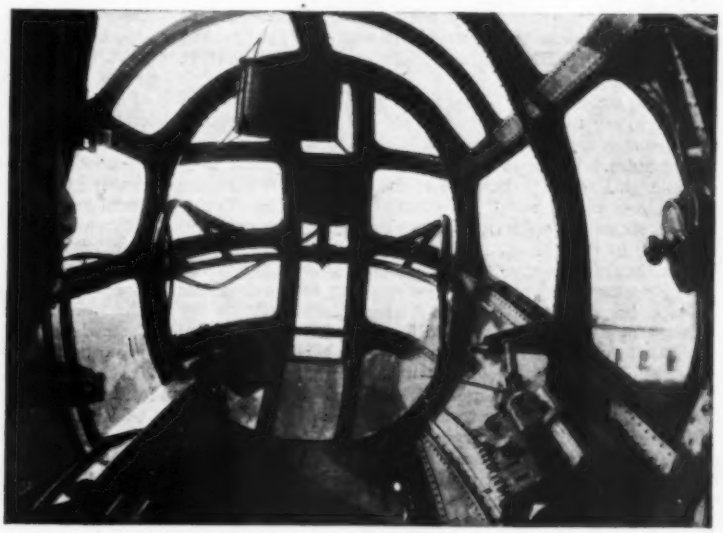
When the turret is retracted the A.300 has fine lines.

The retractable turret, showing the "dome" which permits the gunner to keep watch when the body of the turret is retracted.

The installation of the Bristol Mercury IX engines. The well-designed nose may also be studied.



A drum feeds ammunition to the floor gun *via* a flexible guide.



An interior of the nose, which houses a belt-fed machine gun and the bomb sight. The "visibility" is of an exceptional order.

COMMERCIAL AVIATION

A POSSIBLE LANDMARK for Trans-Tasman pilots : 9,000ft.-high Mount Egmont. With its peak above the clouds, can generally be picked up a hundred miles from land. Mount Egmont is an extinct volcano and rises sheer and solitary from the Wanganui plain.

THE WEEK AT CROYDON

"A.Viator" Displays an Indisposition to Regard the Week's Happenings with Due Seriousness

ON Thursday last another "F" class liner was delivered by De Havilland to Imperial Airways, making three up to date. This was *Fortuna*, and on Friday Capt. Jimmy Youell took the new machine on a trial flight on the Zurich run, where something able to compete with the Swissair Douglas D.C.3 has long been needed from a British point of view.

Frobisher, I am informed, has been fitted with three-bladed props all round, which are said to improve take-off, decrease vibration, increase economy and leave speed where it was. If I were you I would not believe, without further enquiry, the rumour that standardisation has yet gone so far as the importation of Manx maintenance staff wearing their tripartite pants.

Thrilling times we do have, to be sure. Our shrubbery, home of many a feathered what-not up to now, has suddenly become alive with furtive little folk in bowler hats digging holes. Walk past and rattle the bushes with your umbrella and see a startled face and drooping moustache bob up from every bush. The recent importation of cart-loads of straw suggests the worst—that they are going to nest there in the spring.

Then there is the mystery man with charts of the whole heating system under his arm, who darts into our offices and taps the radiators with his little hammer. Some say he is an ex-railwayman who did not get a square deal from life, having been put on to tap the wheels of non-stop expresses at a small wayside station, and that he is suffering from suppressed tappage. Others believe he is an international spy, signalling to a pal at the other end of the hot-water system, and everyone wishes he would stop it and buy a xylophone instead.

From time to time, first in Holland and then in England, experiments have been made to test the efficacy of high flying as a cure for whooping-cough.

This should not be confused, by the way, with whoopee cough, which racks your chest and rocks the bathroom walls the morning after a party, causing the mirror to depict you as a sere and yellow centenarian surrounded by a dense swarm of entirely non-existent dancing midges.

High flying is no cure for this, and, indeed, it has been known to lead to even more severe attacks of whoopee.

The results obtained by the experiments have not been published, but not content to let sleeping germs lie, a newspaper correspondent recently tried out high flying as a cure for the common cold. Carefully selecting victims, it is supposed, who had impeached the veracity of his stories, secretly watered his beer or otherwise insulted him, he had them taken up to incredible heights, and obtained considerable kick from the results.

Victim No. 1, who earned his living snuffing in the beech leaves of our woodlands for truffles, entirely lost his sense of smell, whilst the second subject, a professional tea-taster, has since O.K.'d a sample of onion soup in mistake for fine Bohea. Patient No. 3, a prominent member of the Noise Abatement League, has gone stone deaf and can no longer grumble; whilst the fourth case, a man who hates vocal music, is afflicted by a continuous singing in the ears. Otherwise, the experiment was a huge success.

A wireless message, fit to gladden the hearts of those bachelors and spinsters who worry themselves to twitters over the falling birth-rate and consequent speedy end of the world, was received at Croydon last week. It read somewhat as follows: "Aeroplane X left Y for Croydon 13.00 hours. Pilot Z with 16 children."

Nice to be a wealthy airline pilot, able to feed, clothe and educate 16 offspring, to say nothing of bailing them out of Vine Street in a body after Boat-race night, when they approach years of discretion.

As a matter of fact, the children were refugees, and, if anything ever showed how necessary the services of air hostesses may be, it was this trip with 16 kiddies from Prague to Croydon. The finest testimonial was presented by one little creature of three years, who, when handed to its mother on arrival, howled dolorously (and apparently

(*Concluded at foot of next page.*)

COMMERCIAL AVIATION (CONTINUED)

Iceproof Airscrews Compulsory

FOLLOWING the recent enforcement of regulations for the compulsory fitting of de-icing equipment to the wings of commercial aircraft, an Air Ministry *Notice to Aircraft Owners and Ground Engineers* (No. 2, 1939) records an amendment of Air Navigation Directions, 1936 (A.N.D.13) to make compulsory the fitting of approved de-icing equipment to airscrews. The amendment will have effect from September 1, 1939.

The regulation will apply to "all public transport flying machines registered in the United Kingdom and engaged on regular scheduled air services, whenever the weather reports available at the time of departure indicate the probability that conditions predisposing to ice formation will be encountered."

The only approved airscrew equipment at present is the fluid de-icer described in Sec. 5 of A.M. Pamphlet No. 83, *Ice Formation on Aircraft and its Prevention*. Applications for approval of new types should be made to the Under-Secretary of State (C.H.2), Ariel House, Strand, London, W.C.2.

The Five Lieutenants

THE Latécoère *Lieutenant de Vaisseau Paris*, which carried out one North Atlantic crossing last year for Air France-Transatlantique, has now four sister ships in existence. The French Naval air service has just taken delivery of its third six-engined 40-tonner of this type and these boats will figure in French Naval manœuvres next May.

The *Lieutenant* itself is known as the Latécoère 521, the second (also belonging to Air France-Transatlantique) is the 522, and the three naval units, which have been christened *Altair*, *Algol* and *Aldebaran*, are Latécoère 523s. All are powered by six Hispano 12Y engines of 890 h.p. each and cruise at about 130 m.p.h.

The original flying boat was produced as long ago as 1928, but was entirely rebuilt in 1937, and the later models have incorporated a number of modern features which have improved their performance. The latest information regarding the 522 is that she will be taken from the Latécoère workshops at Toulouse to the Etang de Biscarosse during the course of this week and should be ready to make her first flight towards the end of February.

Another Empire Base Project

YET a fifth site for the land-sea air base for Imperial Airways has now been suggested—albeit very unofficially. The scheme, for what it is worth, involves the excavation of an artificial pool somewhere on the south-east coast, this pool to be fed by pumps from the sea. At first glance the idea may seem to be somewhat ambitious, but a permanent base other than at Southampton Water will eventually be needed, and if the choice of site can be made irrespective of other considerations (such as last-minute Admiralty objections) then there is not likely to be trouble in the future.

The site in question would be chosen on a stretch of coast where obstructions are non-existent. Given suitable circumstances, the base, with the equipment necessary for a modern airport, might be provided, it seems, for a cost as comparatively low as £500,000.

The previously suggested sites have been in Southampton Water, which is at present used, though not at all suitable for the purpose; in Langstone Harbour, Portsmouth, where the scheme has been resurrected as a private venture after various difficulties and has now been put back again; in the Thames Estuary, where both seaplane and landplane alighting areas have been roughly surveyed near Mucking Flats; and, finally, at Pembroke Dock which has been recently suggested, very unofficially, as a possible base.

The General Will Not Play

AN unexpected snag has arisen over British Airways' London-Lisbon mail service, which was to have been inaugurated, following survey flights last autumn, on January 2. It is now announced that, when the Foreign Office sought General Franco's permission for regular services to be operated over the territory which he occupies in Northern Spain, he communicated a refusal, taking the attitude that he could not grant such facilities to a country which withheld from him full diplomatic recognition.

Since, in order to avoid Spanish territory altogether, it would be necessary to make a long sea crossing of the Bay of Biscay, and as British Airways' fleet of twin-engined machines is deemed unsuitable in such circumstances, an *impasse* has occurred. Ways and means to a solution are now being examined.

Direct to the Shetlands

FOLLOWING an application to the Licensing Authority last October, Allied Airways hope to run a direct Aberdeen-Shetland service this summer. The present run, operated by Allied, *via* Caithness and the Orkneys, occupies 2¼ hours, whereas the new route would mean less than 1½ hours between Dyce and Sumburgh aerodrome, Shetland. The present single and return fares of £4 and £7 respectively will be reduced to £3 5s. and £5 15s.

The service is to begin on June 24 and will be run to the end of September at least three times weekly. If it develops beyond a seasonal service it will, in all probability, benefit the Aberdeen-Shetland mail contract already held by Allied.

Mr. Gandar Dower intends to inaugurate the service with a D.H. Rapide, and later, if the demand warrants it, a D.H.86B; this type has not yet previously been used north of Glasgow. Allied Airways have offered to help towards the cost of enlarging Sumburgh Aerodrome should that ultimately become necessary.

Irish Sea Traffic

DURING the past twelve months the most important work in Ireland as far as civil aviation is concerned has been that in the development of the two airports at Dublin (Collinstown), and beside the Shannon estuary at Rynanna. These aerodromes were described in *Flight* of November 10. Towards the end of last year, incidentally, the transatlantic meteorological services at Foynes were taken over by the Eire authorities and Mr. A. Nagle, the Eire Director of Meteorological Services, is now in control. Presumably Mr. C. D. Peters remains in control of the actual work there. Irish Sea Airways, however—at present composed of Aer Lingus Teoranta and West Coast Air Services—carried nearly three times as many passengers as they did during 1937.

The figures for the period between April 1 and November 19 on the Dublin-London service are 3,208 and 7,095 for the two years. The Dublin-Castletown (I.O.M.) service figures increased from 949 to 2,246. Mails were carried to the Isle of Man during the summer, and it is possible that, at the end of next year when the mail contract is reviewed, all first-class mail will be transferred to the air service.

THE WEEK AT CROYDON

(*Continued from page* 65.)

without the usual human need to draw an occasional breath) for 15 minutes without stopping because it was parted from its air hostess. Mind you, I've known grown-ups behave in much the same way at the end of an air trip when the air hostess has been one of the girls of a lifetime.

Seriously, though, I believe the K.L.M. air hostess on this occasion got up at about 4 a.m. to fly to Prague and brought these children back, and you may imagine that they constituted a whole-time job on the not-so-short journey from Prague to Croydon.

A curious phenomenon—one not unfamiliar to the alienist, of course—is the sort of thing we suffered from last week. No fewer than four leading newspapers were rung up on four successive nights by some half-wit who gave a circumstantial account of a crash on Croydon Aerodrome—he could see the crumpled wreck from his window and the passing of an ambulance on its way to hospital with the injured. When asked for his name, address and 'phone number he merely gibbered. Newspapers have to verify such alarms, so we also suffer.

A German pilot receiving full measure from one of the Airport Bureaux de Change the other day, delightedly remarked, "Ach zo!" to which the immediate reply came from the inevitable opportunist standing nearby: "Zo vot?"

A. VIATOR.

Commercial Aviation

D.C.A. for Burma

THE Governor of Burma has sanctioned the creation of the new appointment of Director of Civil Aviation, and the post will be taken by Capt. A. T. Eadon, who is a very well-known in Indian aviation circles. He was Governor and Principal of the Aeronautical Training Centre at Delhi, which was founded by him in 1935. Previously he had helped to found the De Havilland Technical School in this country. Between 1930 and 1933 he was closely concerned with the Civil Aviation Directorate in India, and, particularly, in the development of air mail services. Mr. R. N. Kathju will succeed Capt. Eadon at the Training Centre.

International Weather

FOR a long time it has been obvious that the increasing range of commercial aeroplanes would demand the complete internationalisation of meteorological reports and facilities. Already Europe may virtually be considered as a single country where such facilities are concerned, and two years ago, in connection with the North Atlantic flights, the four countries concerned in making the experiments took steps to arrange for specially adequate weather information. The matter nowadays is not one merely of providing for meteorological reports from various parts, but of co-ordinating these reports and organising a weather forecasting system which will cover really large areas with accuracy and regularity.

By now, Capt. F. Entwistle, head of the overseas section of the British Meteorological Office, should be on his way to Montevideo, where a conference of all the South American countries is shortly to be held. This conference is of particular importance now that British Airways are preparing for a West African and South American mail service. Until now the two companies concerned in South Atlantic mail flying—Air France and D.L.H.—have provided their own meteorological facilities, but it is obvious that a scientific reorganisation of the whole matter will be much better for all concerned. Needless to say, this country's experiments and information will be put at the disposal of the South American nations, so that these will not need to go through a period of trial and error when starting their weather services.

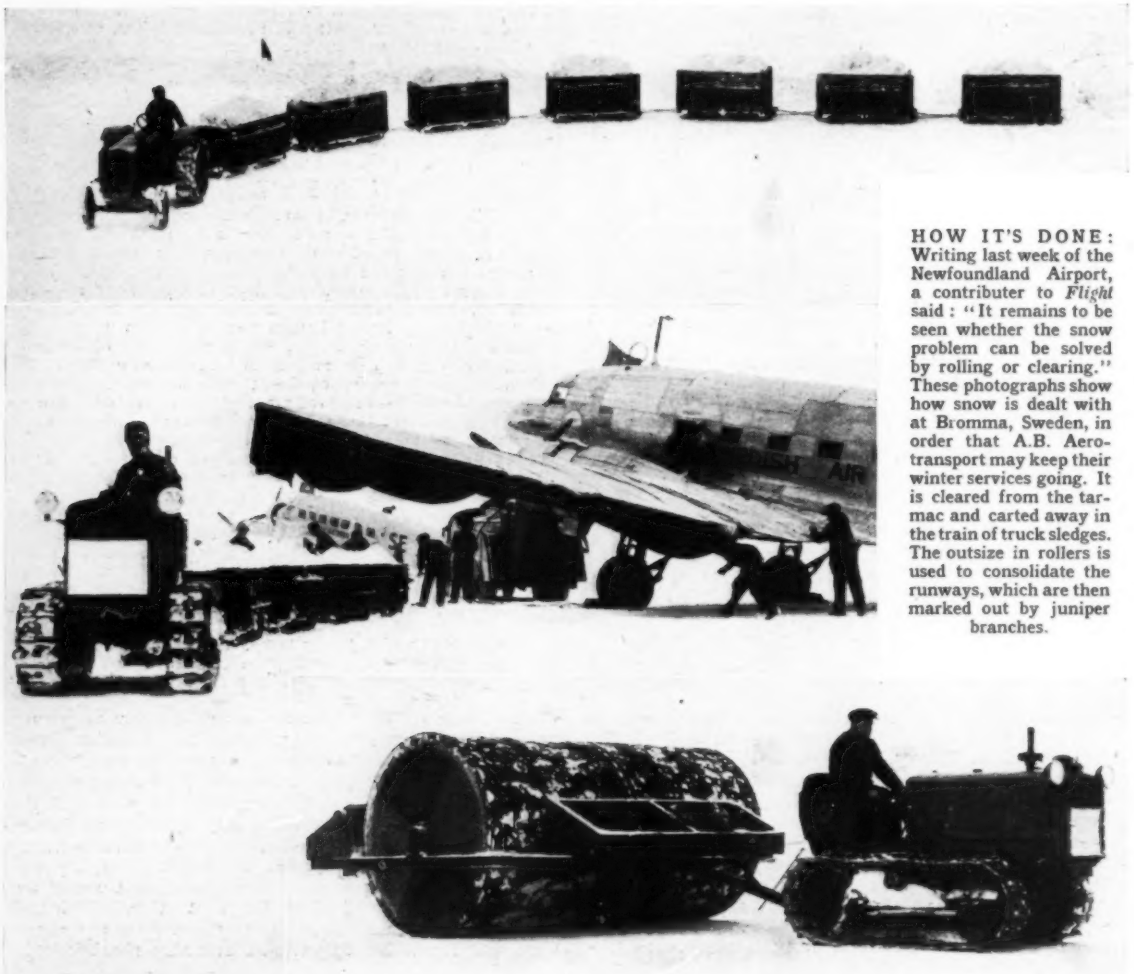
The whole subject is one of world-wide importance and accurate forecasting at any point can only be carried out when complete information is obtainable from all the areas within a 3,000-mile range.

From the Ground Up

SOME further details are now available regarding the commercial pilots' school opened by the Straight Corporation, Ltd. The subjects covered include "A" and "B" licence instruction and instructors' endorsement. Navigational courses and lectures are held in London, and flying and ground training are given at Ramsgate, Ipswich, Exeter, Plymouth, and Weston.

Sqn. Ldr. W. N. Cumming, D.F.C., F.R.Met.S., A.F.R.A.E.S., has been appointed director of training. It will be remembered that he was largely responsible for the details of the inauguration of the New York-Bermuda service, and carried out the first long-range tests of *Caledonia* from Southampton to Alexandria. He holds a Master Pilot's certificate.

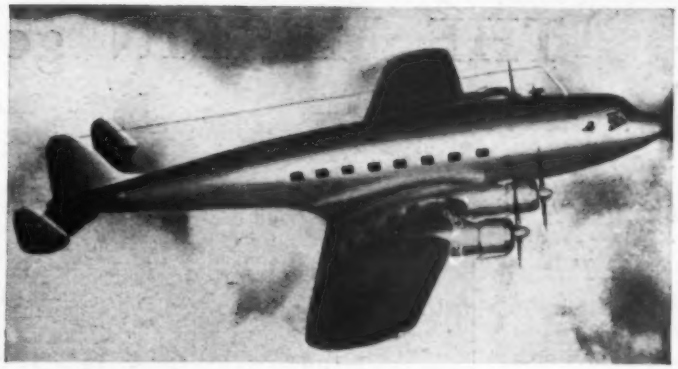
Sqn. Ldr. Cummings, it is stated, is assisted by a staff of twenty-nine instructors, and has at his disposal a fleet of forty aircraft.



HOW IT'S DONE: Writing last week of the Newfoundland Airport, a contributer to *Flight* said: "It remains to be seen whether the snow problem can be solved by rolling or clearing." These photographs show how snow is dealt with at Bromma, Sweden, in order that A.B. Aerotransport may keep their winter services going. It is cleared from the tarmac and carted away in the train of truck sledges. The outsize in rollers is used to consolidate the runways, which are then marked out by juniper branches.

ULTRA-MODERN

Preliminary Details of the Fairey Commercial Aeroplane : Pressure Cabin, Tricycle Undercarriage and Low-Drag Flaps



This picture of a model of the Fairey F.C.1. gives a good idea of how the machine will look. It is possible that the triple-rudder arrangement will give way to a twin-rudder type of tail. The engines will be Bristol Taurus of about 1,000 h.p. each.

PRELIMINARY details of the new Fairey commercial aeroplane which was announced recently may now be published. From them it is obvious that in the new F.C.1, as the type is called at present, we shall have a commercial aeroplane of outstanding merit. This, of course, was to be expected from the designers of the famous Hayes firm.

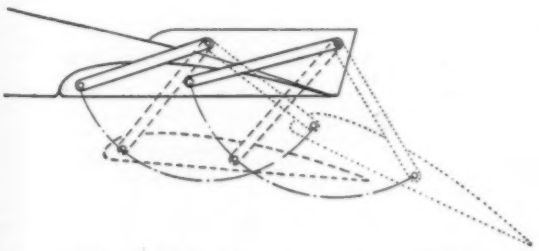
For a gross weight of 42,000 lb. the estimated top speed is 270 m.p.h. and the cruising speed approximately 220 m.p.h. when carrying 30 passengers in an airtight cabin. It is several months since *Flight* first pointed out that airtight cabins—pressure cabins is the accepted term for them—might be forced upon operators by the demands of the travelling public, not because the operational height was necessarily very great but solely to protect the eardrums of the passengers against the effects of rapid changes of pressure. We are, therefore, pleased to see that this feature is being incorporated in the new Fairey commercial aeroplane.

In its general design the F.C.1 follows the modern formula: low-wing cantilever monoplane, retractable undercarriage, v.p. airscrews, and trailing edge flaps. There is, however, a good deal more in it than that. Following modern tricycle landing technique, the undercarriage is being designed to cope with the loads resulting from the machine making its approach to the aerodrome "down the beam" at a speed of about 100 m.p.h. The main wheels will touch first (the lengths of rear and front undercarriage legs being proportioned to ensure this), and the machine will then be thrown on to the front wheel, thus reducing the wing incidence and preventing kiting off again.

Cruising on Half Power

The cruising speed of 220 m.p.h. has been calculated to correspond to throttling the four Bristol Taurus engines to approximately half-power. That gives some idea of the aerodynamic efficiency of the F.C.1. This is obtained in part by very careful streamlining and partly by raising the wing loading to 32 lb./sq. ft. Normally such a wing loading would result in a very high landing speed and an even higher speed of approach. These are avoided by introducing a special flap developed by the Fairey technicians.

To be useful both for take-off and landing, a wing flap should be capable of giving high lift with low drag and, at a different angle, high lift with high drag. Moreover, it should have hinge moments sufficiently low to make rapid change of flap angle possible. So far as wind-tunnel tests by the N.P.L. and in the new Fairey wind tunnel have indicated, the new Fairey flap goes a long way towards fulfilling these conditions.



The invention which has made the F.C.1 possible. Diagrammatic representation of the Fairey auxiliary aerofoil, which can be used both for take-off and landing, according to its position. The rear links are partly housed in fairings on top of the main wing.

As shown in the diagram, the flap is an auxiliary aerofoil of approximately one-third the chord of the main wing. In flight it nestles closely into the main wing and should offer little extra drag. The auxiliary aerofoil is carried on a system of links, so located and proportioned that during the first part of its descent the flap lies with its chord approximately parallel with that of the main wing. Further movement increases the flap angle until, at the maximum lift (used for landing) the flap makes an angle of 30 deg. with the wing. In that position it acts as a slotted flap, but in addition to this, the increase in wing area gives extra lift so that a high maximum lift coefficient is combined with a reasonable wing loading—equivalent to about 25 lb./sq. ft.

Low Drag for Take-off

In the intermediate position the auxiliary aerofoil can be regarded as forming the lower wing of a sesquiplane, and except for the usual allowance for biplane interference the auxiliary aerofoil contributes its quota of lift without excessive drag. In other words, in this position the Fairey flap can be used for take-off. This cannot be done with split flaps on account of their high drag.

There is every reason to hope that with the Fairey flap arrangement the apparently high wing loading will not result in an unduly high stalling speed. How effective the flap is may be gathered from the figures of maximum lift coefficient for the plain wing, the wing with split trailing edge flap, and the wing with Fairey flap. These figures are: Plain wing, 1.45; wing with split flap, 1.9; wing with Fairey flap, 2.45. Thus it will be seen that the increase in lift is of the order of 31 per cent. compared with the plain wing, while the gain over a wing with split flap amounts to 29 per cent. The low drag for take-off is, of course, an added advantage and one not possessed by most other flap arrangements.

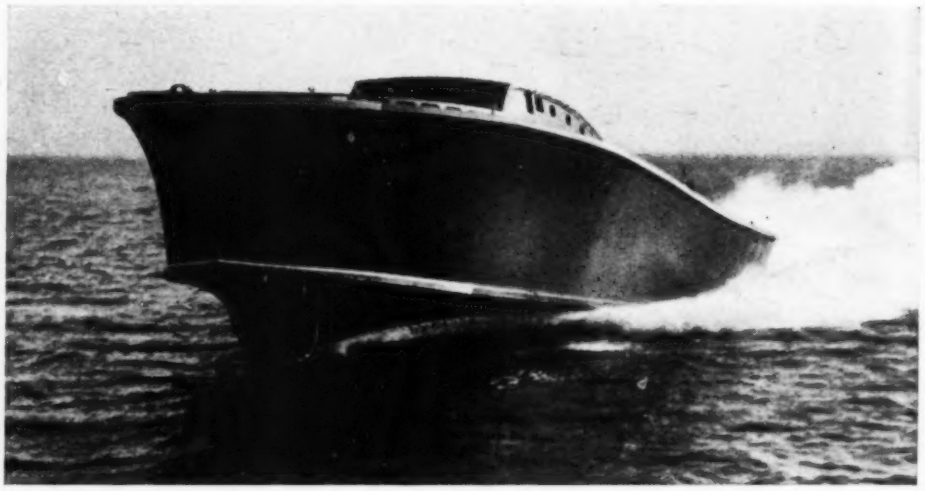
The flap has been dealt with at some length because it is one of the most interesting features of the new Fairey commercial monoplane. Moreover, in combination with the tricycle undercarriage it endows the aeroplane with features not encountered in the majority of aeroplanes. In fact, it may be said to make possible a substantial improvement in cruising speed without introducing those dangerous features at the lower end of the speed scale to which we called attention last week, and to which "Indicator" refers in this issue.

A few facts and figures relating to the F.C.1 will indicate how much the type will contribute to British commercial aviation when, probably some time in 1940, it goes into service. For a gross weight of 42,000 lb. the machine will have a payload varying from 4,500 lb. for a range of 1,700 miles to 9,500 lb. when the range is reduced to 500 miles. The wing span will be 105ft. and the wing area 1,300 sq. ft. The airtight cabin will have a length of 32ft. and a width of 10ft. and a height of 7ft. Normally there will be accommodation for 30 passengers, but for longer ranges the number will be reduced and sleeping accommodation provided. The run to take off with full load is estimated to be 560 yards, and the distance to clear the 60ft. barrier from standing start 800 yards.

The crew will include two pilots, a W/T operator and flight engineer, steward and chef. Needless to say, provision will be made for the most up-to-date navigational and blind-flying equipment.

THE MERLIN goes to SEA

Mr. Hubert Scott-Paine Installs Three in New M.T.B.



The British Power Boat Company's new M.T.B. at speed. It has three Rolls-Royce Merlin engines of about 1,000 h.p. each. The absence of even short masts is a noteworthy feature. The three deck turrets are out of sight in this picture.

PRIVATE ventures have ever been a passion with Mr. Hubert Scott-Paine. The first—at any rate so far as his aeronautical career is concerned—was the buying, with Cdr. James Bird, of the Supermarine company from its founder, Mr. Noel Pemberton-Billing, during the early part of the war. That venture turned out a great success. The firm made money, and some years later Mr. Scott-Paine sold his share to Vickers at, one may assume, a handsome profit. In between, he had many private ventures. For instance, one may recall that he financed, without assistance from the Government, the Supermarine participation in the Schneider Trophy contests which in the end brought the trophy to this country. The ultimate winner was a Supermarine S.6 B monoplane. True, it was built after Mr. Scott-Paine severed his connection with the firm, but if he had not initially supplied the machine on which Henri Biard was able to bring the trophy to England, the Italians would have retained it.

Since he founded the British Power Boat Co., Ltd., Mr. Scott-Paine has retained his enthusiasm for private ventures. It will suffice if we recall his sporting challenges in motor boat racing at home and America. And now we have another private venture which it took courage to decide upon. This time the venture has taken the form of a triple aero-engined motor torpedo boat, the sort of versatile little craft which could cause a lot of unpleasantness in such waters as the North Sea, for example.

The new craft was demonstrated in Southampton Water on Tuesday of last week. The day was calm and there was a smooth sea, so that there was little opportunity for judging the seaworthiness of the craft. However, Mr. Scott-Paine has had the boat out in winds of about 75 m.p.h. and in really rough seas, and has found that she handles perfectly, even at high speed.

"Torpedoed" in the Mist

If the smooth water and the thick haze prevented rough-weather demonstrations from being given, they gave an opportunity to show how the craft could creep up on an enemy vessel. After giving proof of the amazing manœuvrability of the boat at high and low speeds, Mr. Scott-Paine disappeared in the mist, and we were asked to keep a sharp look-out for him. He had intended to sneak up on us from the Hamble shore, but so thick was the weather that he could not find the buoy and had to be content with approaching us from the Calshot direction.

The first sign of the approaching motor boat was a bow-on view. One could not be certain, for a long time, whether it was a buoy that had become visible through the mist or whether it was in fact "Scottie" getting ready to torpedo us. Gradually it became obvious that the object seen *was* approaching. Strain our ears as we would, we could detect not the slightest trace of engine noise. When the boat was very close one could hear the hissing sounds of the hull cutting through the calm water, but the engine was inaudible until the vessel was within 100 yards or so of the *Medina*, on board which were the guests invited to see the demonstration. It was not difficult to imagine the torpedo boat creeping into torpedo range at night without being spotted.

On an overall length of 70ft. the new boat, powered by three Rolls-Royce Merlin engines of approximately 1,000 h.p. each, will do its 40 knots or so. The acceleration and deceleration are simply astounding, and the manœuvrability is an eye-opener. It was revealed afterwards that the silent approach had been effected with two of the Merlins stopped and the third throttled to give a speed of 8-10 knots.

The Sting in the Tail

Armament may include two 21-inch or four 18-inch torpedos. In addition there are three anti-aircraft guns in deck turrets, and depth charges, and smoke-screen apparatus can be carried as well. Withal the craft has a range, at a cruising speed of about 20 knots, of 1,000 miles. That is a rather staggering range when one remembers that the Merlins can give a maximum speed of over 40 knots, and there should be many uses for such a vessel which, with a crew of two officers and seven ratings, could do a great deal of harm to an enemy in the narrow seas. Two countries, Holland and Sweden, have already recognised its potential usefulness, and the British Admiralty is now examining its suitability for work with the Royal Navy.

The three Merlin engines are installed near the stern, the two outer ones driving direct and the centre one through a vee drive. Comparatively few modifications of the engines have been necessary, except those connected with the propeller drive, the carburetters and the alteration of the supercharger gear ratio.

A notable feature of the engine installation is that at no speed is there any appreciable vibration. Another noteworthy aspect is the silence of the three Merlins. The lack of noise when creeping along on one engine has already been mentioned. But even with all three engines going all out the noise is slight and curiously non-directional. When heard in the haze the other day it was impossible to judge the direction from which the engine noise came. Nor could one be certain whether the hum emanated from the torpedo boat or from an aircraft flying overhead in the mist.

This latest aeromarine co-operation between the British Power Boat and Rolls-Royce companies promises to add a weapon which may be destined to play an important role in our defences.

ABOUT AIRPORTS

CURRENT during the Airports Exhibition, *FLIGHT* of February 2 will be a *SPECIAL AIRPORTS NUMBER* containing articles by experts on the subject, together with a detailed guide to the exhibits.

THE INDUSTRY

"Snow-and-gas" Fire Extinction

FOR some years American aircraft manufacturers have been fitting a certain extinguishing system for use against engine fires in the air or on the ground. So far the gear has not been widely adopted in this country, though it figures on the new De Havilland Flamingo transport now on test and is being specified for a number of forthcoming prototypes, including the Fairey F.C.1. It has also been used on Howard Hughes' round-the-world Lockheed 14, Miss Amelia Earhart's Lockheed Electra and the new Bell twin-engined pusher fighter, and has been adopted, it is stated, by practically all the suppliers of equipment to the major American airlines, the U.S. Army Air Corps, and the U.S. Navy, apart from several of the larger foreign lines. There are records of its having put out nineteen engine fires in the air.

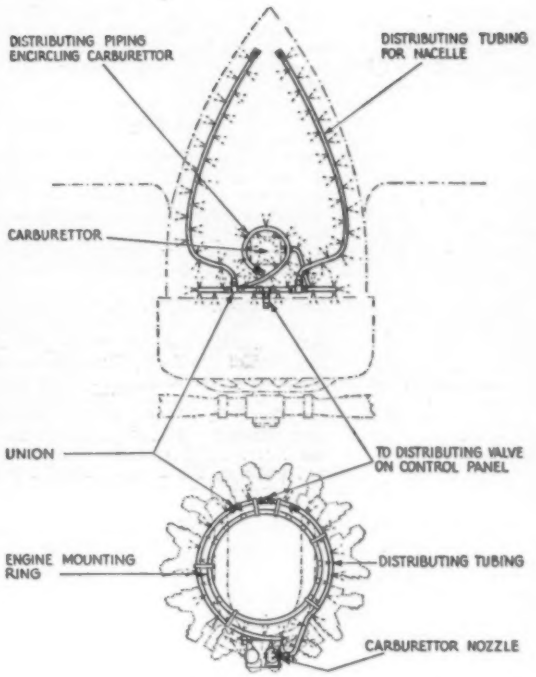
The system, which is manufactured in this country by the Walter Kidde Company, Belvue Road, Northolt, Middlesex, makes use of Lux gas (carbon dioxide), in which flames cannot exist. The gas is non-poisonous and will harm neither the pilot nor the engine. It is discharged under 850 lb. pressure and expands in the form of "snow" and gas; driven by the force of the slipstream it envelops the entire power plant.

The installation, of course, differs widely among various aircraft types, but essentially it consists of three major parts; the cylinder of gas, usually installed behind the fireproof bulkhead; the control; and the distributing piping.

It is customary to mount a remote control on the pilot's instrument panel. The distributing piping is $\frac{7}{16}$in. duralumin tubing installed in a perforated ring round the engine with a loop about the carburettor and an outlet in the intake. Multi-engined aircraft are equipped with a valve to discharge the gas to the appropriate engine. A pull of about two inches on the control releases the extinguisher and the gas discharges under pressure of its own expansion, extinguishing a fire within, it is claimed, about three seconds.

The gear as installed on the De Havilland Flamingo weighs rather less than 20 lb. In the case of a three- or four-engined machine the weight is by no means prohibitive, as only one cylinder is required.

For use in conjunction with the system there is a special fire detector which guards against those engine fires which may be hidden by the nacelle or cowling. The detector consists of an indicator on the instrument panel and heat-sensitive "Luxstats" round the engine. These "Luxstats" are operated by flame as well as by excessive heat (250 deg.), and generate pressure which is transmitted through the tubing to the indicator on the instrument panel or to an electric alarm. Schemes are available whereby the detector and extinguisher may be combined so that they operate quite automatically



Layout of the Walter Kidde fire-extinguishing equipment in a radial-engine nacelle.

During a recent visit to the Walter Kidde works we were shown the report of a fire-extinguishing demonstration before prominent Dutch technicians and fire brigade experts. The fuselages of two Fokker machines were used and four comparative tests were made with typical Dutch thoroughness and with convincing results.

Electric Machinery Production

A FILM depicting the manufacturing processes of electric motors and dynamos has been prepared by Higgs Motors, Ltd., of Witton, Birmingham. They state that they will be pleased to loan this film free of charge to any recognised engineering society or similar organisation interested. The film is in two 16 mm. reels and lasts for approximately half an hour.

The Uses of Nickel

ADVANCES in the uses of nickel in aircraft and engine manufacture are detailed in the annual survey of the nickel industry, obtainable from the Mond Nickel Co., Ltd., Thames House, London, S.W.1.

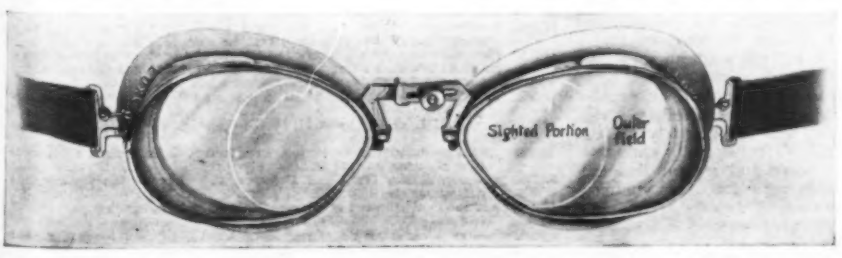
Nickel is, of course, used extensively as an ingredient of steels for highly stressed parts, and it is also an important constituent of Inconel, a corrosion-resisting alloy used extensively for exhaust manifolds.

Something to Celebrate

WE always had the impression that Reid and Sigrist, Ltd., of instrument fame, were a "happy" firm. Now, having studied a cross-section, as it were, at the works annual dinner, organised by the R. and S. Social Club, we are certain of it.

The Ace of Spades, on the same formidable Kingston By-pass as the company's works, was the scene of the celebration.

Mr. G. T. Folkerd (works manager) having proposed "The Firm" in what local newspapers used to call "a few well-chosen words," Sqn. Ldr. G. H. Reid, D.F.C., Wh.Ex., A.C.G.I., M.I.Ae.E. (managing director), rose to reply, a Napoleonic paper hat quite failing to bestow an air of stern authority. He told his audience how the firm had started literally as a three-man affair (Mr. Blease and Mr. Lever being named as the other two) in the depression period ten years or so ago. They produced their first job for the Air Ministry before they had even received the contract. The trouble started when the A.I.D. came down and, sheltered by umbrellas



TWO IN ONE: Those who have struggled with the problem of wearing both glasses and goggles will welcome the introduction of these new "Luxor No. 12" safety-glass goggles, which include "Motex" safety-glass prescription lenses at the modest inclusive figure of 55s. The makers are E. B. Meyrowitz Ltd., 1a, Old Bond Street London, W.1.

THE INDUSTRY (CONTINUED)

from the rain leaking through the roof, inspected the machine-shop plant, which consisted of a 30s. drill of which they were inordinately proud. It was left to Mr. Folkert to teach them real machine-shop practice. To-day they had two instrument works, an aircraft factory, and operated three Reserve schools [Desford, Stapleford Abbotts and Stoke].

The firm was among the pioneers of the five-day week, and he believed that "tea at 11 a.m. and 4 p.m." spelt greater working efficiency in the long run.

Going on to pay a tribute to his "right-hand man," Miss Kirkness, Sqn. Ldr. Reid told how Lord Nuffield bet him £10 that he would not get the Desford School built and working in three months. Largely owing to Miss Kirkness, they had it going in two months and twelve days.

Mr. George Lowdell ("the hardest-working instructor in England") likewise came in for a well-deserved pat on the back.

Other speakers were Mr. T. Rose, Mr. G. H. Warr-Wood, Sqn. Ldr. "Taffy" Jones (a bright speech in stentorian tones, delivered standing on a chair), and Mr. Bowker, of the Desford A.I.D. Mr. J. Hawes, secretary of the Social Club, presented Sqn. Ldr. Reid with a handsome silver undercarriage for soda syphons.

Guests included Group Capt. A. Gray, M.C. (Deputy Director, Directorate of Training, Air Ministry), Mr. Waller (I/C. North-West London Area, A.I.D.), and some of the Martlesham pilots (in case, perhaps, the evening wanted any livening up; it didn't).

Avro-Armstrong's London Move

As from January 10 the Piccadilly offices and showrooms of A. V. Roe and Co., Ltd.; Armstrong Whitworth Aircraft, Ltd., and the aero engine department of Armstrong Siddeley Motors have moved to 10, Old Bond Street, London, W.1. The telephone number, Regent 3551, remains unchanged.

Dialling the Decibels

METERS for noise measurement are described in detail in the latest list issued by Marconi Ekco Instruments, Ltd., Electra House, Victoria Embankment, London, W.C.2. Two types are described—the T.F.500, for the measurement of impulse noise, and T.F.397, for the measurement of steady noise.

Aircraft Servicing Equipment

AN extraordinarily complete catalogue of aerodrome, servicing and workshop equipment and materials, covering both their own products and those of most leading manufacturers for whom they are agents, has been issued by Brown Brothers, Ltd. It is fully illustrated and covers some 200 "lines." Copies are obtainable on application to Brown Brothers, Ltd., Great Eastern Street, London, E.C.2.

Specialised Cutting

IT is reported by Edgar Allen and Co., Ltd., of Imperial Steel Works, Sheffield, that "Allenite" tungsten-carbide tipped tools have been giving very good service to a firm in the South of England on special aircraft work. The job consists of reducing in one cut S.11 steel aircraft bolts from 1in. down to $\frac{7}{8}$in., $\frac{3}{4}$in., $\frac{5}{8}$in. and $\frac{1}{2}$in. diameter, plus and minus 0.001in., on a Ward capstan lathe. The bolts are checked with a ring gauge and have to be produced with a mirror finish. An ordinary grade of "Allenite" is used, running at a speed of 180ft. per minute, with 240 cuts per inch feed. No tool, the user reports, has stood up to the work so well as "Allenite" in the confined space of a roller steady box tool.

Flexible Bearings

A NEW type of flexible bearing for points or fittings, which does not need lubrication and which should have certain applications for aircraft use, is described in a new publication by Wilmot-Breeden, Ltd., Eastern Works, Birmingham, 1.

Known as the "Oscillith," it is a cushion made of a casing of rubber (which may be distorted, but not compressed) and in which a spiral spring is incorporated as a compressible component so that it may bring the rubber into the desired state of deformation. Actually this casing has the property, when subjected to an axial pressure tending to force the ends together, of forming a series of successive and regular flanges, internally and externally, without any variation of its volume. It has the property, also, of returning to its original dimensions, without any trace of permanent deformation, as soon as relieved of the pressure placed on its ends.

PUBLICATIONS RECEIVED.

National Advisory Committee for Aeronautics, Report No. 627: The Experimental and Calculated Characteristics of 22 Tapered Wings, by R. E. Anderson; 10 cents. No. 628: Aerodynamic Characteristics of a large number of Airfoils Tested in the Variable-Density Wind Tunnel, by R. M. Pinkerton and H. Greenberg; 15 cents. No. 631: Airfoil Section Characteristics as Applied to the Prediction of Air Forces and their Distribution on Wings, by E. N. Jacobs and R. V. Rhode; 10 cents. No. 632: The Crinkling Strength and the Bending Strength of Round Aircraft Tubing, by W. R. Osgood; 10 cents. No. 633: Pressure Distribution over an N.A.C.A. 23012 Airfoil with a Slotted and a Plain Flap, by C. J. Wenzinger and J. B. Delano; 15 cents. No. 634: Calculation of the Chordwise Load Distribution over Airfoil Sections with Plain, Split, or Serially-hinged Trailing-Edge Flaps, by H. J. Allen; 10 cents. No. 638: The Influence of Lateral Stability on Disturbed Motions of an Airplane with Special Reference to the Motions produced by Gusts, by R. T. Jones; 10 cents. Superintendent of Documents, Washington, D.C., U.S.A.

Mechanical World Year Book, 1939; 1s. 6d., Emmott and Co., Ltd., 31, King Street West, Manchester.

Les Flottes de l'Air en 1938, by Robert Gruss; 54 Frs., Societe d'Editions Geographiques, Maritimes et Coloniales, 17, Rue Jacob, Paris, France.

Booklet: *Oilite Self-Lubricating Bronze Bearings*, The Manganese Bronze and Brass Co., Ltd., Handford Works, Ipswich.

Kameraden der Luft, by J. Matthias; Rm. 5.80, Verlag Reimar Hobbing, Berlin, Germany.

The Hire-Purchase Act, 1938, *and the Retailer*, by R. B. Hurton; Bankers Commercial Security, Ltd., 39-45, Finsbury Square, London, E.C.2.

The Hawk: The Journal of the Royal Air Force Staff College, 3s.

Aviation École de l'Homme, by Robert De Marolles; "Présences," Librairie Plon, 8, rue Garancière, Paris 6, France.

Universidad Nacional de la Plata: Seccion II: Entrega de la Presidencia de la Universidad al Doctor Juan Carlos Rébora; Homenaje a Dardo Rocha; Labor de Los Centros de Estudios. La Plata, Argentine Republic.

Views on Air Defence, by Lt.-Gen. N. N. Golovine in collaboration with a technical expert; 5s., Gale and Polden, Ltd., Wellington Works, Aldershot.

NEW COMPANIES.

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

MORRISONS DEVELOPMENTS, LTD.—Private company, registered December 16. Capital, £5,000 in 5,000 ordinary shares of £1 each. Objects: To acquire from John H. Robertson the benefit of certain inventions relating to anti-vibration lock-nuts, etc. The directors are: Anthony E. Morrison-Bell, Richard V. Wrightson, and Christopher W. Wrightson. Registered office: Carlton House, Lower Regent Street, London, S.W.1.

G. H. GREGORY & CO. (PLASTICS), LTD.—Private company, registered December 16. Capital, £900 in £1 shares. Objects: To acquire the business of manufacturers of aircraft components carried on at 79, Lea Bridge Road, Leyton, E.10, as "G. H. Gregory & Sons." The directors are: Geo. H. Gregory, Henry D. C. Gregory, Chas. G. Gregory, and Geo. G. Buckeridge. Solicitors: H. B. Wedlake Saint & Co., 115, High Holborn, London, W.C.1.

HORTON KIRBY FLYING CLUB, LTD.—Private company, registered December 20. Capital, £1,000 in 1,000 shares of £1 each. Objects: To carry on business as instructors in aviation and to carry on flying clubs, etc. The permanent directors are: Geo. W. Alexander and Mrs. Dorothy S. Alexander. Registered office: The Aerodrome, Horton Kirby, near Dartford, Kent.

HIGH GRADE CASTINGS, LTD. (347,828).—Private company, registered December 30. Capital, £75 in 75 shares of £1 each. Objects: To carry on the business of founders and foundry manufacturers, engineers, etc. The directors are: John B. Corrie, Alfred J. Baillot, Austin S. Beech, Arthur G. Corrie. Registered office: Linslade Works, Leighton Buzzard, Beds.

THE LUTON FLYING CLUB, LTD., was registered as a private company on January 2 with a nominal capital of £1,000 in 1,000 shares of £1 each. The objects are to carry on business as instructors in aviation, etc., to establish and maintain lines of aerial communication, to carry on the business of carriers of passengers, goods and mails, etc. The directors are: The Hon. Peter R. L. Beatty, The Hon. Peter Pleydell Bouverie, William Leddlie, Wm. H. C. Rollo and Viscount Forbes (all directors of Personal Airways, Limited). Registered office: The Airport of London, Croydon, Surrey.

PETTERS, LIMITED, was registered as a private company on January 2, with a nominal capital of £25,000 in 25,000 shares of £1 each. The objects are to acquire the business of manufacturing, selling and servicing compression, ignition and combustion engines and accessories carried on at Yeovil by the company lately known as "Petters, Ltd.," but to be known as "Associated British Engineering, Ltd.," and the benefit of foreign agencies and sales organisations in connection with the said business, and to carry on the business of engineers, electricians, boiler makers, oil engine manufacturers, etc. The first directors are: Alan P. Good, Thomas B. Keep, Richard C. Petter, Robert J. Norton and James Day. Solicitors: Sydney Morse and Co., Alder House, Aldersgate Street, London, E.C.

AIR CREWS, LTD.—Private company, registered January 7. Capital, £3,000 in 3,000 shares of £1 each. Objects: To carry on business as instructors in aviation, aerial navigation, aerial and ground signalling, dealers in aircraft and aircraft engines, transporters of passengers and goods, etc. The permanent directors are: John A. M. Duport and Andrew J. S. Morris. Solicitor: F. G. Bowles, 252, High Holborn, London, W.C.1.

ROLLASON AIRCRAFT CONSTRUCTIONS, LTD., was registered as a private company on January 5, with a nominal capital of £100 in 100 shares of £1 each. The objects are to carry on the business of mechanical and aeronautical engineers, manufacturers of aircraft, motor boats and balloons, etc. The directors are: Frederick W. Jones, insurance broker, and Samuel B. C. Bushell, chartered accountant. The registered office is at Airport of London, Croydon.

AERONAUTICAL PATENT SPECIFICATIONS

(*Published January* 19, 1939.)

16905. SPERRY GYROSCOPE CO., LTD., HARDING, W. G., and NISBET, R. H.: Gyroscopic instruments (497,584).

17294. WHITEHEAD TORPEDO CO., LTD., and JONES, L.: Gyroscopic steering-apparatus of automobile torpedoes (497,655).

17311. HIRTH-MOTOREN GES.: Securing of the cylinder heads of engines (497,657).

7. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and CLINCH, A. C.: Carburetters for internal-combustion engines (497,674).

18222. SPURR, E.: Rudders, aircraft wings, and like fluid-reacting planes (497,443).

22891. EVANS, J. J., and QUILTER, J. R. C.: Parachutes (497,448).

24419. ROSE, W. K.: Aeroplanes (497,500).

29528. DEEKAY AIRCRAFT CORPORATION, LTD., and S. C. HART-STILL: Aircraft-wing construction (497,623).

33704. DORNIER-WERKE GES., and DORNIER, C.: Aircraft landing-flaps and control surfaces (497,509).

16476. ARADO FLUGZEUGWERKE GES.: Knee-shaped spring leg for aircraft (497,559).

36009. SPERRY GYROSCOPE CO., LTD., HARDING, W. G., and NISBET, R. H.: Gyroscopic instruments (497,707).